

July 16, 1940.

E. W. BILLINGS, JR
ERASING AND NUMBERING MACHINE

2,207,966

Filed March 17, 1938

10 Sheets-Sheet 1

Fig. 2.

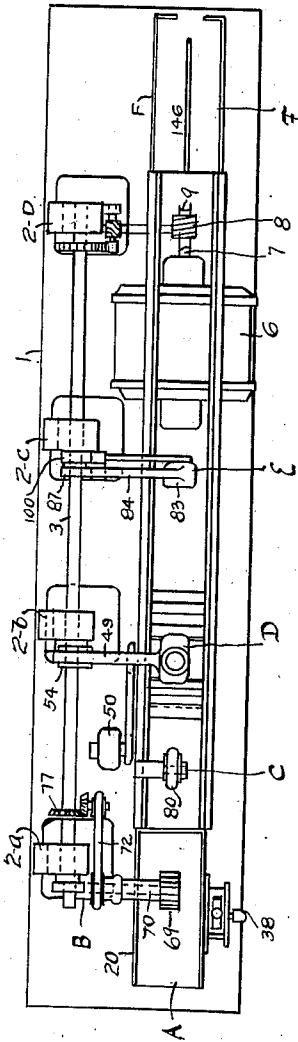
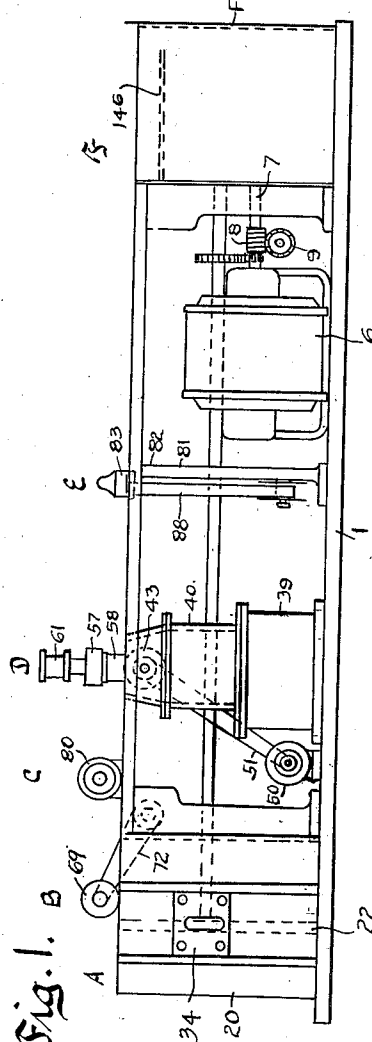


Fig. 1. B



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Fig. 4.

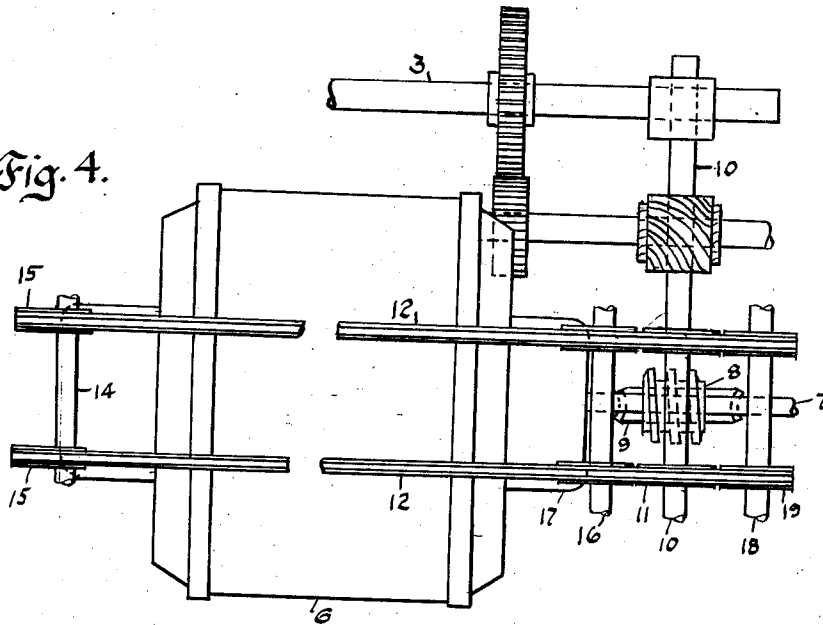
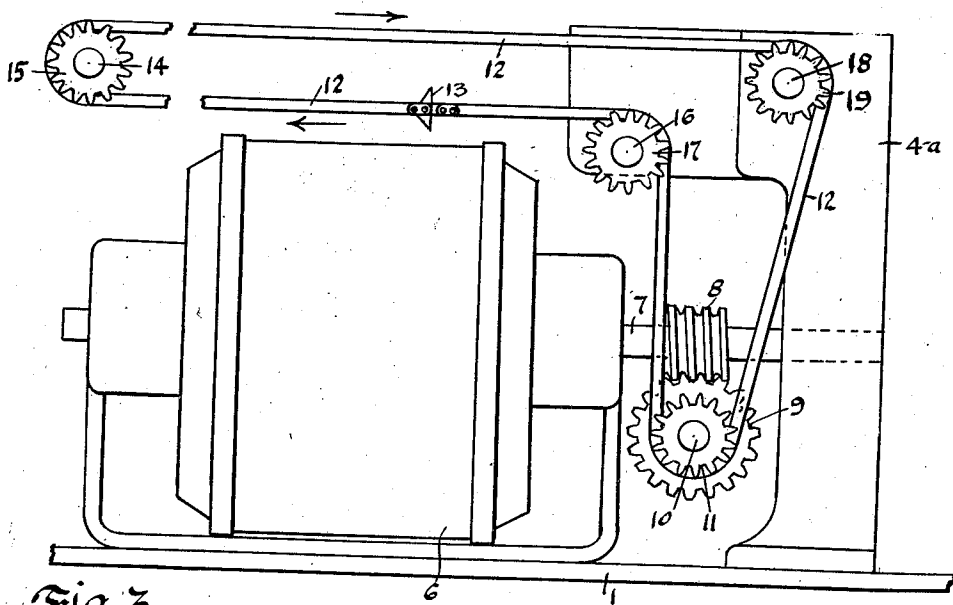


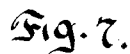
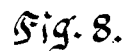
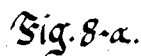
Fig. 3.



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ERASING AND NUMBERING MACHINE

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10 Sheets-Sheet 4

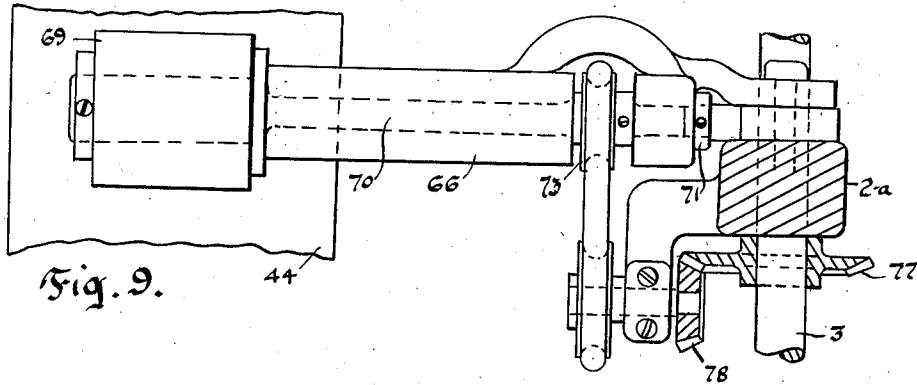
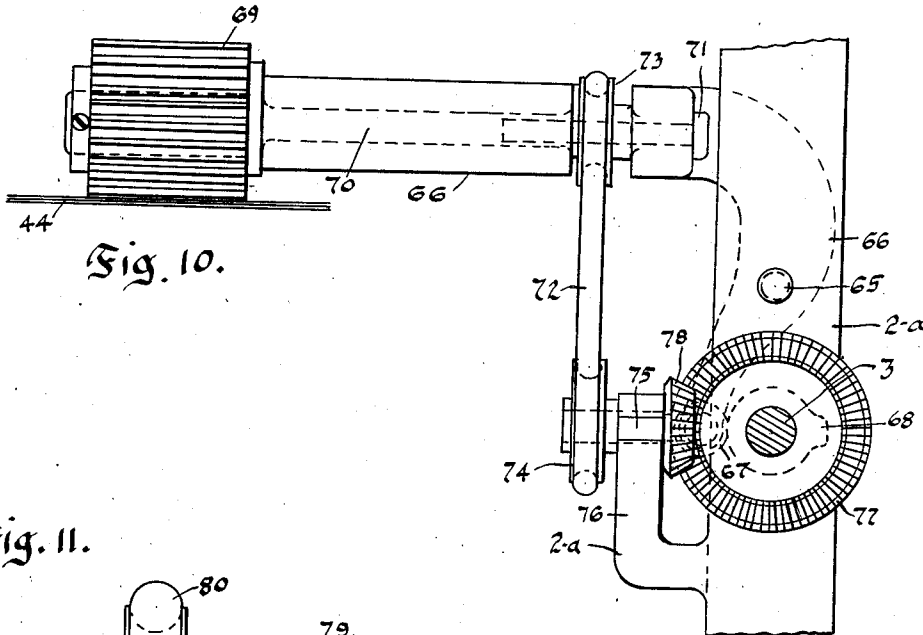
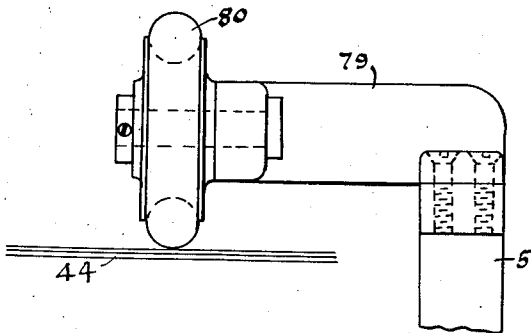


Fig. 11.



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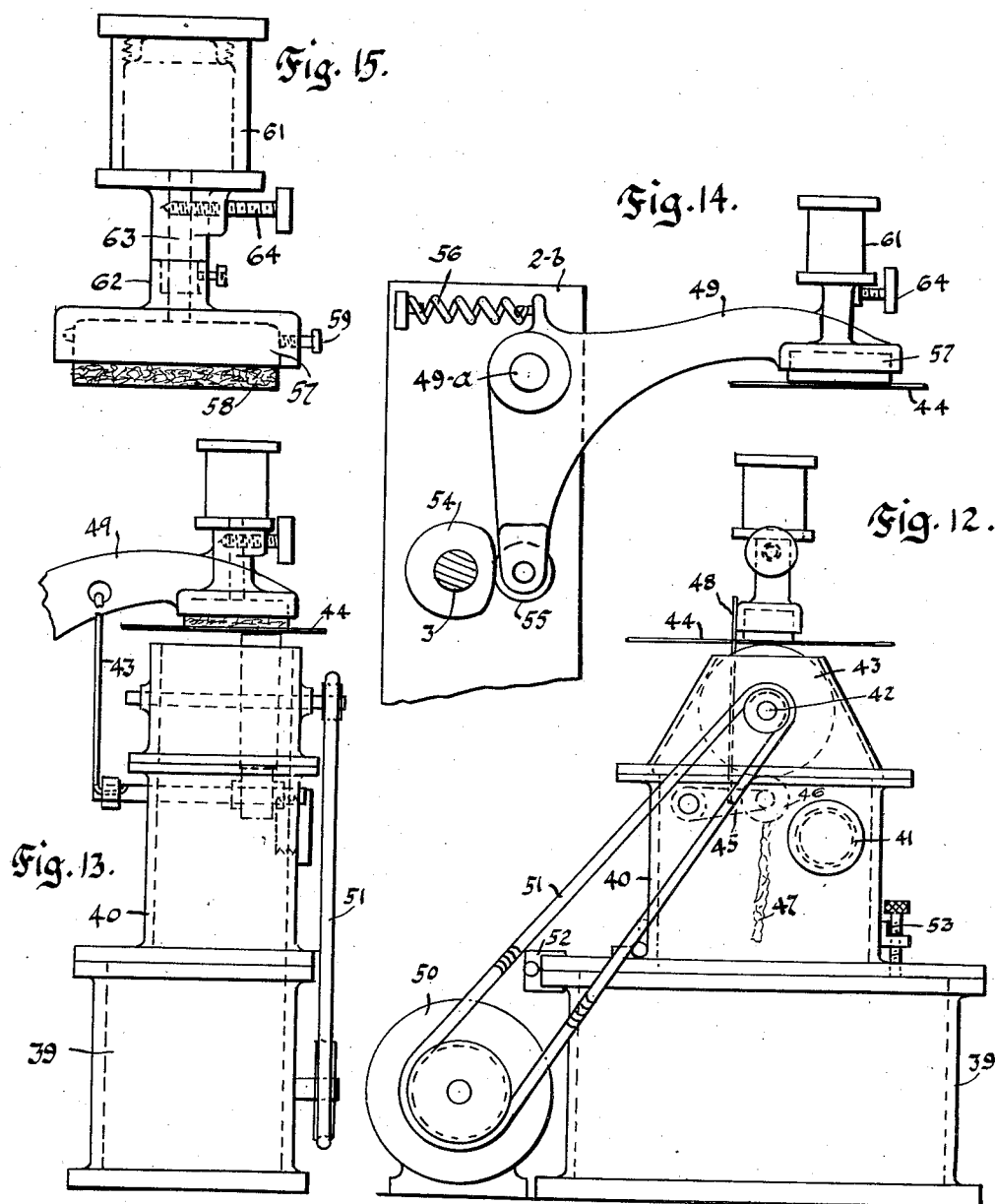
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ERASING AND NUMBERING MACHINE

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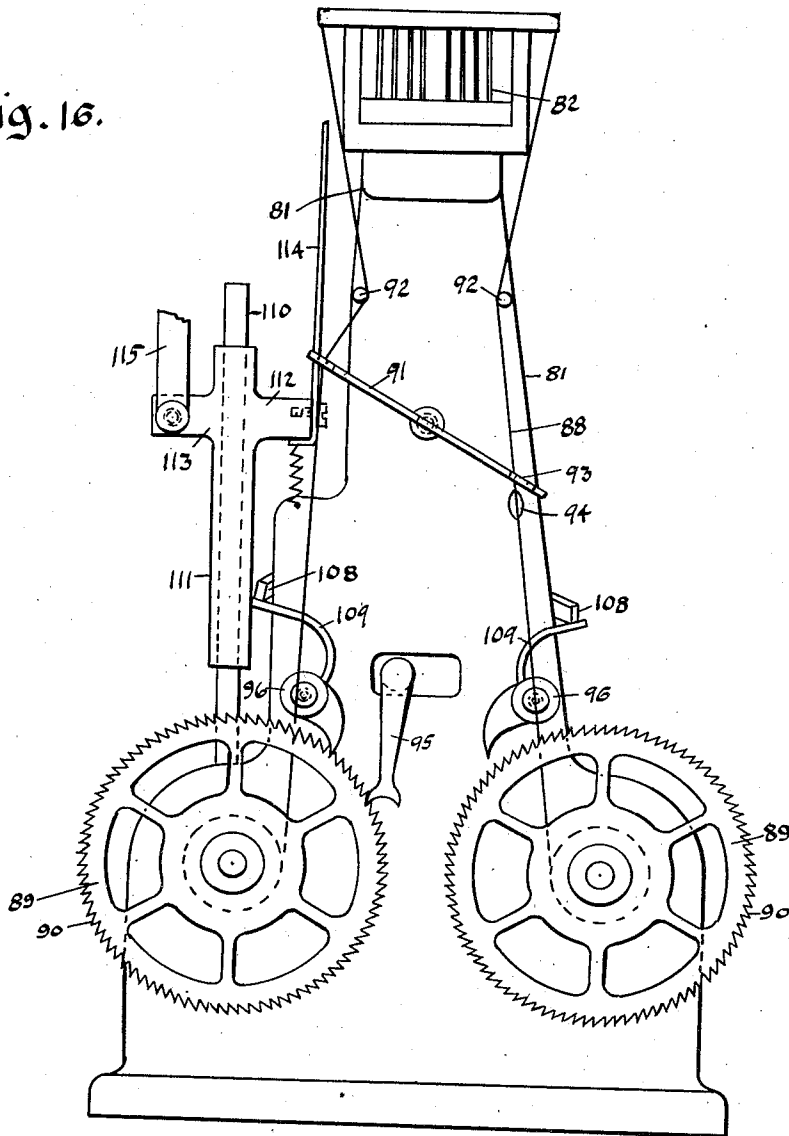
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Fig. 16.



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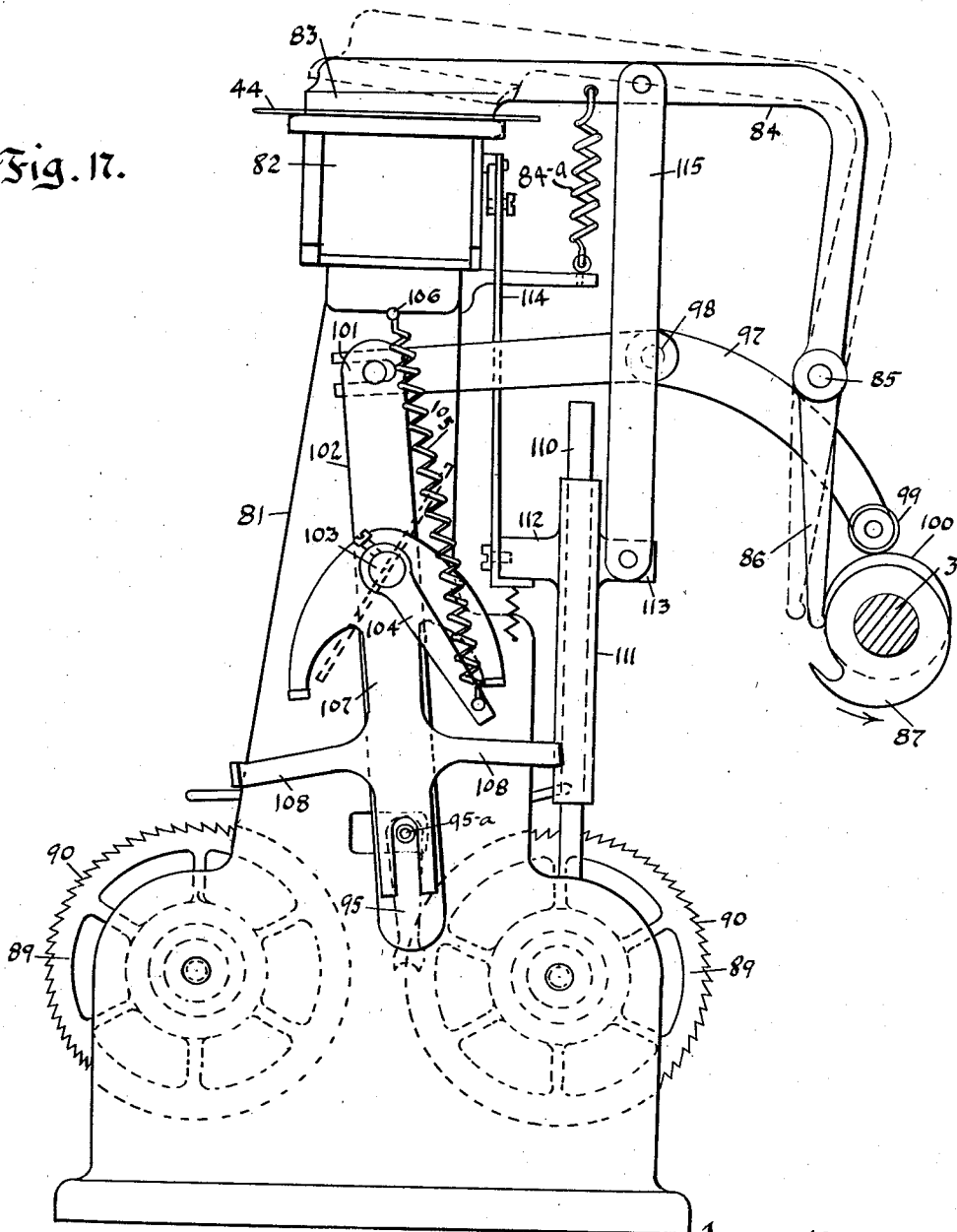
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Fig. 17.



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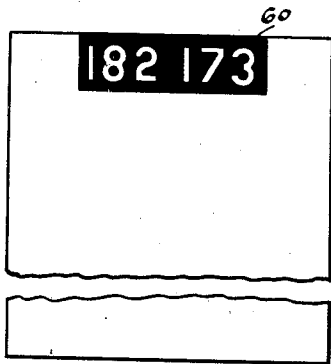


Fig. 19.

Fig. 20.

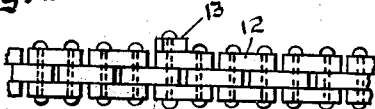


Fig. 20-a.

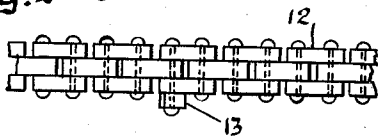
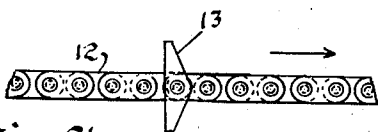
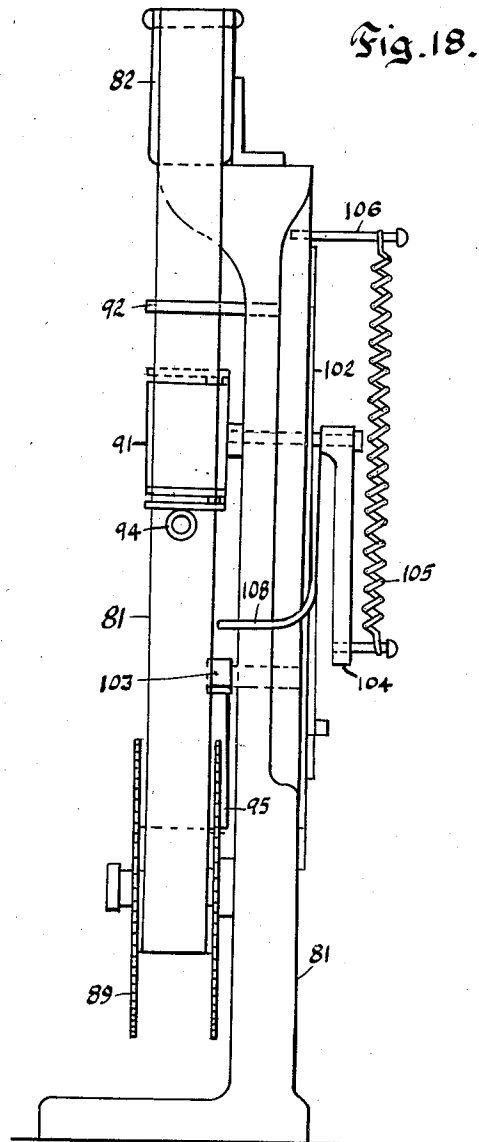


Fig. 21.



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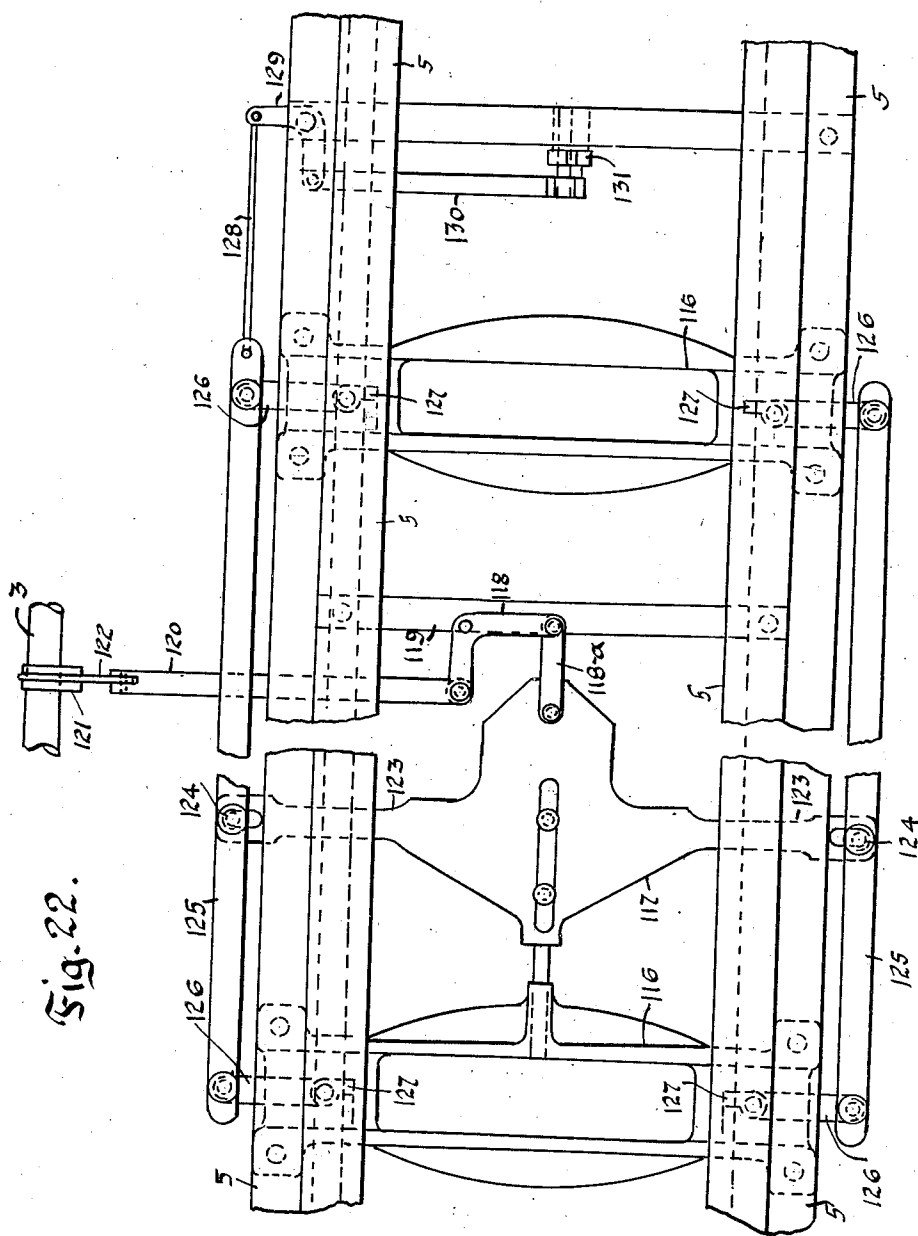


Fig. 22.

Fig. 23.



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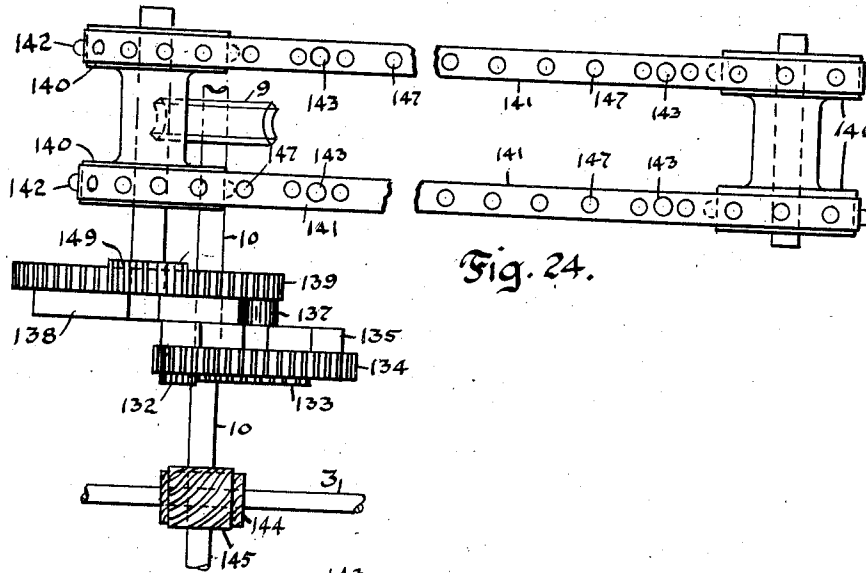


Fig. 24.

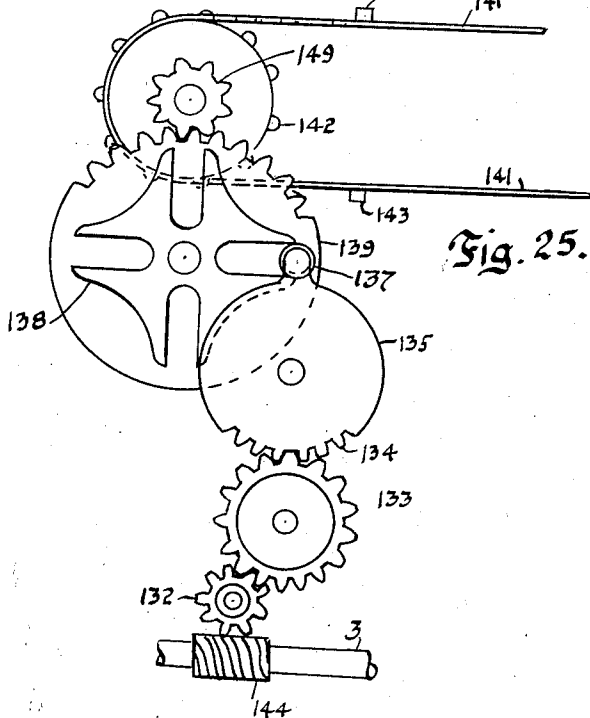


Fig. 25.

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2,207,966

ERASING AND NUMBERING MACHINE

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Application March 17, 1938, Serial No. 196,460

3 Claims. (Cl. 101-1)

This machine relates to that class of machines which are commonly termed "business machines" and is designed to perform certain operations on cards used in connection with machines for compiling statistical data and also for filing and indexing purposes. In many of these business systems cards are used, on which are stamped certain filing or key numbers. This numbering is usually done with a hand numbering machine, and the ink generally used in such machines penetrates the material of the card and is practically impossible to erase. The inability to erase or change the number on the card prevents the card from being used more than once, and as some offices use many thousand of such cards monthly, and if the key number could be erased and re-printed as many times as the life of the card stock would permit, great economy would result in the yearly expenditure for such cards.

As a preliminary operation prior to the use of my invention, a dark or black spot is printed on the card, such printing forming a surface on which the key numbers can be printed in white or other contrasting color and preventing the numbering ink from penetrating the material of the card.

This application is a continuation in part of my application Serial Number 17,519, filed April 20, 1935 now Patent No. 2,114,462, for Erasing machines. The machine described in the above application provided a means for automatically removing or erasing the said key figures, thus preparing the card for the reprinting with a new number or symbol. With the means provided by this prior machine the cards are fed through the machine and as each card passes through it the numbers are erased, preparing the cards for renumbering and enabling the cards to be used repeatedly. It will be noticed that this prior machine does not provide for the printing of the dark spot nor for the printing of the new number. In the application above referred to the statement was made that it was my intention to invent a machine provided with a numbering device for re-numbering the cards after the erasure of the old number had been made. This has been accomplished in the machine embodied in this application with the additional function of being able also to print the dark spot on the said cards. In this machine the cards are fed through the erasing mechanism which erases the former number and then passes over the numbering mechanism which renumbers the said cards. In the above functions the cards are passed through face down. The erasing mechanism

is so arranged that it can print the dark spot on the said card instead of erasing, in this case the cards being fed through face up. It will be understood that the printing of the dark spot could not be accomplished simultaneously with the erasing and renumbering, as the printing on the dark spot requires time to dry before being numbered.

I accomplish these objects by the mechanism illustrated in the drawings accompanying this specification, in which similar numerals refer to similar parts in the several views. Figure 1 is a side elevation of the machine with most of the parts being shown in diagrammatic form and with the chains omitted. Figure 2 is a plan view of the machine, also having much of the mechanism shown in diagrammatic form, and with the chains omitted. Figure 3 is a side elevation showing the motor and chain drive. Figure 4 is a plan view of the motor, the chain drive, and the cam-shaft drive, the latter being partly diagrammatic. Figure 5 is a side elevation, partly in sections, showing the method of lifting the cards preparatory to feeding the said cards through the machine. Figure 6 is a plan view, partly in section, showing the ratchet mechanism by which the cards are lifted. Figure 7 is a detailed fragmentary view, partly in section, showing the method by which the lifting mechanism engages the lifting screw. Figure 8 is a plan view showing the method of engaging the lifting screw. Figure 8A is a side elevation of the same with the screw in section. Figure 9 is a plan view of the card feeding mechanism. Figure 10 is a side elevation of the card feeding mechanism. Figure 11 is a side elevation of the card hold-down bracket and wheel. Figure 12 is a front view of the inking and erasing mechanism. Figure 13 is an end view of the inking and erasing mechanism. Figure 14 is a plan view showing the mechanism for inking or for applying pressure to the cards when erasing. Figure 15 shows the ink holding device and the interchangeable felt member. Figure 16 is an end elevation of the numbering mechanism showing the ribbon feed and reversing mechanism. Figure 17 is an end view from the opposite side of Figure 16 showing the detailed method of operating the number changing device, the ribbon reversing mechanism, and the pressure arm for pressing the cards down onto the numbering machine. Figure 18 is a front elevation of the mechanism shown in Figures 16 and 17, with the driving mechanism omitted. Figure 19 is a view of one of the cards showing a preferred arrangement of dark spots

and numbers. Figures 20 and 20A show a plan view of the two endless chains in their spaced relation to each other. Figure 21 is a side view of the said chains showing the card-pusher in its upright position. Figure 22 is a plan view of the card-pusher mechanism. Figure 23 is a cross-sectional view of the card rails, the same being shown in proper relation to the rails in Figure 22. Figure 24 is a plan view of the intermittent card-feed mechanism. Figure 25 is a side elevation of the intermittent mechanism.

The construction of this machine is as follows: 1 is a base plate on which the various elements are mounted. Located near the back of the base plate 1 are stanchions 2—A, 2—B, 2—C, and 2—D which serve the purpose of locating and supporting the cam-shaft 3 and other elements. Located near the front of the machine are other stanchions 4 which are adapted to support the cardtracks 5 and also to provide bearings for the chain and cam-shaft drives. The chain drive mechanism consists of the motor 6 mounted on the base 1 and having on its armature-shaft 7 a worm 8. This worm engages the teeth of the worm-wheel 9 having on its transverse shaft 10 two sprocket-wheels 11 adapted to drive the two card-carrying chains 12. Mounted on the stanchion 4—A is a transverse sprocket-shaft 18 carrying thereon two sprocket-wheels 19. At the end of the machine adjacent to the card-feeding mechanism and journaled in the stanchion 4—B is a similar transverse shaft 14 having mounted thereon two sprocket-wheels 15. Also located on the stanchion 4—A is a similar transverse shaft 16 carrying thereon two sprocket-wheels 17. The endless chains 12 are adapted to be actuated by the sprocket 10 and travel over the other sprockets 17, 15, and 19, the direction of movement of said chain being shown by the arrow. In Figures 1 and 2 the locations of the various mechanisms are as follows: the card-lifting mechanism is at A, the card-feed mechanism at B, the card hold-down mechanism at C, the inking or erasing mechanism at D, the numbering mechanism at E and the discharge mechanism at F.

The card-lifting mechanism consists of a box 20 open at its rear end and of a size suitable to receive a supply of the cards to be acted upon. Vertically mounted on the base 1 and also mounted at its upper end on a plate 21 is a lifting-screw 22. The lifting-screw 22 has near its lower end a ratchet-wheel 23 adapted to be actuated by the pawl 24, this pawl being actuated by a cam 25 located on the cam-shaft 3, this cam 25 being adapted to actuate the lever 26 and link 27, the lever 26 being held against the cam 25 by the spring 28. The motion of the lever 26 and the link 27 is communicated to the said pawl 24 by the slide plate 30, and the length of stroke can be varied by means of the adjusting screw 29. Located on the front wall of the card-box 20 are vertically disposed guides 31. Adapted to rise and fall within the guides 31 is a plate 32 having connected thereto a lifting-platform 33. On the front of the said plate 32 is mounted an additional plate 34 being spaced from said plate 32 by means of the blocks 35. Hingedly mounted on the plate 34 are two half-nuts 36. Between the said half-nuts 36 is a spreader-bar 37 capable of being actuated by the knob 38 by means of which the said half-nuts can be disengaged or engaged with the lifting screw 22, thus enabling the lifting-platform 33 and its associated mechanism to be lifted or lowered at will, to suit the number of cards located in said box 20.

The construction of the card-feeding device is as follows: Pivotaly mounted at 65 on the stanchion 2—A is a cam-lever 66 having located on its lower end a cam-roll 67 adapted to be actuated by the cam 68, the latter being located on the cam-shaft 3. The upper portion of the cam-lever 66 has a rubber-tired wheel 69, revolvably mounted on a shaft 70, the latter being journaled in said cam-lever 66, being held in place by the collar 71. The rubber-tired wheel 69 is preferably grooved as shown in Figure 10. The said rubber-tired wheel 69 is driven by a belt 72, operating a pulley 73 mounted on the shaft 70. The belt 72 is preferably a spring-belt in order to take care of the variation in center distance due to angularity. The spring belt 72 is driven by a pulley 74, the latter being mounted on a shaft 75 journaled in a bracket 76 of the stanchion 2—A. The shaft 75 is driven by the beveled gear 77 and bevel pinion 78, the said bevel gear 77 being driven by the cam-shaft 3. It will be seen that the mechanism causes an alternate rise and fall of the rubber-tired wheel 69 and as this wheel revolves rapidly it feeds a card from the card-holder into position from whence it feeds through the machine, one card being fed each time the wheel 69 presses down on the said cards. Bracketed on one of the supporting card-tracks 5 is an arm 79, having journaled in its outer end a rubber-tired wheel 80 adapted to bear down on the card which has just left the card-feed mechanism. This wheel 80 is not power driven.

The construction of the inking and erasing mechanism is as follows: Supported on the base plate 1 is a spacer member 39 having mounted on its upper side a tank 40 for the purpose of holding the solvent used in the erasing process. The said tank can be filled through the opening and plug 41. In the upper part of the tank 40 is a shaft 42 carrying thereon a felt wheel 43, the latter being of such size that its lower edge dips into the solution in the tank 40 and on its upper side is adapted to bear against the under side of the card 44. Also located within the said tank is a lever arm 45 carrying a small felt wheel 46 which in turn is provided with a wick 47 for the purpose of feeding the solvent to the felt wheel 43, especially when the quantity of solvent in the tank 40 is low. Motion is imparted to the lever 45 by means of a rod 48 which is connected to the cam-lever 49. The felt wheel 43 is driven by the auxiliary electric motor 50 which drives the said wheel 43 by means of the spring belt 51. Means are also provided for varying the height of the wheel 43 and therefore the pressure against the card to be erased, said adjustment being accomplished by the hinge 52 and adjusting-screw 53. Pivotaly mounted at 49—A on the stanchion 2—B is a cam-lever 49 adapted to be actuated by the cam 54 on the cam-shaft 3 and by the cam-roll 55, the said roll 55 being held against the said cam 54 by means of a spring 56. The outer end of the lever 49 is provided with a receptacle 57 adapted to receive a suitable block of felt or similar material 58, the latter being held in place by a screw 59. When this lever is used in connection with erasing, a dry block 58 is used, its function being merely to provide pressure on the card underneath while the felt wheel 43 is in action. When the machine is to be used for printing the dark spots 60 the ink receptacle 61 is inserted in a suitable socket 62 in the cam-lever 49. The ink or other material used for printing the dark spot 60 is contained in the receptacle 61 and capable

of being fed through the passage 63 communicating with the felt block 58 which becomes saturated with the material contained in the receptacle 61. The flow of said printing material is controlled by the thumb screw 64.

The construction of the numbering mechanism is as follows: Mounted on the base 1 is a supporting column 81 having mounted on the top of said column a numbering device 82 of the ordinary type and provided with means for number changing as each card passes through the machine. The cards 44 are fed over the numbering device 82 and the number is impressed or printed on the under side of the card. As each card stops in the proper position for the numbering to be impressed or printed on the dark spot on said card, a presser-plate 83 clamps down on top of the card 44 insuring good contact between the numbering device and the card. This presser-plate 83 is carried on an arm 84 pivoted at 85 on the stanchion 2—C and having a cam-lever 86 adapted to engage the cam 87 which is mounted on the cam-shaft 3. This cam is so designed and timed that the presser-plate 83 comes down on the card 44 very quickly and with considerable pressure, aided by the spring 84—A, and due to the shape of the cam is very quickly released. Adapted to be threaded over the numerals of the numbering device 82 and between said numerals and the under side of the card 44 is a ribbon 88 coated or impregnated with a suitable pigment which will be visible when impressed upon the said dark spots. Located near the bottom of the column 81 are two spools 89 having ratchet teeth 90 on the periphery of each wheel. The ribbon 88 is wound on the cores of the ribbon spools 89 and extends upwardly, being threaded through slots in a reversing arm 91; thence around guide pins 92 and thence up and over the aforesaid numbering device 82. Near each end of the ribbon is a small eyelet 94 snapped onto the said ribbon and which is of a size which will not pass through the slot 93 in the reversing arm 91. When the eyelet 94 reaches the slot 93 and fails to pass through it it lifts the said arm 91 which reverses the ribbon-feed ratchet pawl 95. So the said ratchet pawl shifts over to the opposite ratchet spool 89 and the locking pawls 96 are also reversed as regards that contact with the teeth 90 of the said ratchet. The method of feeding or rotating either of the ratchet spools 89 is accomplished by a cam-lever 97 pivotally mounted at 98 on the stanchion 2—C and having on one end a roll 99 adapted to be actuated by the eccentric 100. On the opposite end of the cam lever 97 is a slot 101 which is located under the main reversing lever 102. This reversing lever is journaled on the pin 103 having attached to its lower end and extended through to the opposite side of the column 81 a pin 95—A which is secured to the ribbon-feed ratchet pawl 95. The reversing arm 91 is also secured to the shaft 103. Also secured to the shaft 103 is a spring-lever 104 having a spring 105 attached to the column 81 at 106 in such a manner that when the shaft 103 is partially rotated the said spring-lever will move to the opposite position, the spring 105 holding the shaft 103 and its associated parts in that position until it is again reversed by the action of the ribbon eyelet 94 on the reversing arm 91. Also pivotally mounted on the shaft 103 is a plate 107 having arms 108 curved around the column 81 and adapted to alternately engage the bent rods 109 which actuate the ratchet-locking pawls 96. The movement of the

ratchet-feed pawl 96 is obtained by the motion of the cam lever 97, being given a reciprocating motion by the eccentric 100. Mounted on a vertical shaft 110 at the side of the column 81 is a slide 111 having at its upper portion two arms 112 and 113, the arm 112 being operatively connected to the number-changing device of the numbering device 82 by means of the rod 114. Mounted on the arm 113 is a connecting link 115 attached to the presser-plate arm 84 and by that means causes the reciprocating motion of the slide 111, thus changing the number as each card passes through. If desired the numbering device can be arranged so as to provide for a group of numerals such as "182" in Figure 19 which do not change as each card passes through but continues to print on each card the same number until changed manually. In addition to this group of numerals there can be an additional set of numerals which change or advance as each card passes through it. One of the applications of this feature is that the first group of numerals may represent a stock number of goods in inventory and the second group may represent the individual number assigned to each carton or packing case containing said goods.

The card-pusher mechanism is shown in Figures 22 and 23, there being two of these mechanisms complete in each machine. This mechanism consists of the two cross members 116 secured to the under side of the rails 5. Slidably mounted on the members 116 are slide plates 117. The slide plates 117 are actuated by the eccentric 121, mounted on the cam-shaft 3, and connected to said slide plates 117 by means of the eccentric rod 122, the rod 120, the bell crank 118, and the link 118—A. This eccentric 121 operates the card-pusher mechanism on each alternate advance of the cards 44. Transversely extending from the slide plate 117 are two members 123 having slotted ends adapted to engage a pin 124 on a bar 125. This bar actuates the levers 126 which in turn actuate the card-pusher depressor members 127. Attached to one of the bars 125 is a rod 128 connecting the said bar with a bell crank 129, the lever 130, and a rotary stop 131 which is adapted to rise and fall simultaneously with the action of the card-pusher depressors 127. The action of the stop 131 is that when in the raised position it serves to stop the progress of a card in the exact position for erasing or renumbering.

Figures 24 and 25 illustrate an alternative method of feeding the cards 44 through the machine. In the mechanism previously described the card-carrying chains 12 move at a uniform speed and by means of the card-pusher 13 and the pusher-depressor and the stops 131 the cards are advanced and stopped in the proper position for the different operations. In this alternative construction an intermittent motion is provided for operating flat belts 141 driven by the sprockets 140, the said belts moving into each position and pausing there for the time required for the operation and then advancing to the next position. This mechanism consists of a worm 8 mounted on the motor shaft 7 and actuates a worm-wheel 9. The worm-wheel shaft 10 drives the spur-gears 132, 133, and 134, the latter attached to a stop-plate 135 which carries a roller 137 adapted to actuate the star wheel or "Geneva" stop 138, which in turn drives the gear 139, the pinion 149, and the sprockets 140, the said sprockets being provided with teeth 142 adapted to engage the perforations 147 in the two belts 141. These

perforations are located at spaced distances from each other corresponding to the spacing of the teeth on the said sprockets 140. The card-pushers in this case become the buttons 143 which are adapted to carry the cards to the different stations, pausing for each operation, and thence delivering the said cards into the receiving chamber 145. On the worm-wheel shaft 10, in addition to the gear 132 is a spiral gear 144, actuating a second spiral gear 145 by means of which the motion of the shaft 10 is communicated to the cam-shaft 3.

It has been stated that the cards going through the machine for erasing and re-numbering are fed through face down. In order to reverse the cards so that the re-numbered face is visible in the pack delivered by the machine to the receiving chamber F a rod 146 shown in Figures 1 and 2 projects part way across the receiving chamber F, and as the card is shot out of the machine it falls on this rod and in falling automatically turns to a face up position in the said chamber.

The operation of the machine is as follows: The cards 44 being placed in the receptacle 20 resting on the elevator platform 33, the pack of cards is lifted by the elevator or card-feed mechanism at A in Figures 1 and 2 until the top card is in position to be fed onto the chain drive 12, this being accomplished by the mechanism shown in Figures 5, 6, 7, 8, and 8A, the elevator rising in amount equal to the thickness of a card as each card leaves the pack. The card-feed shown as at B in Figures 1 and 2 and in Figures 9 and 10 bears intermittently on the top card in the receptacle 20, and by its high-speed rubber-tired wheel 69, feeds the card forward into position where the chains 12 can pick up the card and carry it along. The rubber-tired wheel 80 and as at C in Figures 1 and 2 serves to hold the cards down on the chain mechanism and rails 5. The first station D reached by the card is that of erasing whatever numbers may be on the dark area 60 of the cards 44. This is accomplished by means of pressure from above and the application of solvent underneath the said card. When the machine is used for erasing and re-numbering the cards are fed into the machine face down, that is, with the numbers on the under side of the card. If it is desired to print the dark area 60 upon cards 44, the cards are then fed into the machine face up, and the pressure arm 49 has its ink receptacle 61 connected to feed the ink into the felt 57. In this case the re-numbering mechanism is manually disengaged. This mechanism is illustrated by Figures 12, 13, 14, and 15. The card then passes to the re-numbering mechanism as at E in Figures 1 and 2, this mechanism being shown by Figures 16, 17, and 18. After the operation at E the card is passed through into the receiving receptacle F, reversing as it falls.

The operation of the card-pusher mechanism is as follows: When the chains 12 carrying pushers 13 come to the top of the rails upon which the chains ride the said pushers contact pins on the said chain-carrying rails causing the said

pushers all to rise to pushing position as shown in Figures 20, 20A, and 21. A card is moved forward by means of the feed wheel 69 onto the chains just ahead of the pushers as they travel forward. When the card reaches the inking or printing station D the pushers are depressed and allow the card to remain for a period of time equal to one pusher space. At the same time the stop 131 arises in the center of the runway in order to stop and hold the card stationary while the inking or cleaning operation is performed. The next pusher remains upright as the depressor 127 is out of the path of the pusher, and the card is carried forward to the next station E for re-numbering. This same performance takes place at this station, and after re-numbering the card is carried forward to the receiving chamber F. When the flow of cards has begun, the cleaning and numbering stations operate simultaneously; thus there is a card being cleaned and another being re-numbered at the same time.

What I claim as my invention and desire to secure by Letters Patent is:

1. In a machine for erasing previously printed data from cards and printing in the areas left clear by such erasure, the combination of an erasing machine, a printing device, means for advancing said cards successively past said erasing machine and said printing device comprising means for arresting said cards at said erasing machine and at said printing device to erase an area and to print in registry with said erased area, and timed mechanism for operating said card advancing and arresting means, said erasing machine and said printing device.

2. In a machine for erasing previously printed data from cards and printing in the areas left clear by such erasure, the combination of an erasing machine, comprising a rotary erasing member and a reciprocable member to press said cards against said rotary member, a printing device, means for advancing said cards successively past said erasing machine and said printing device comprising means for arresting said cards at said erasing machine and at said printing device to erase an area and to print in registry with said erased area, and timed mechanism for operating said card advancing and arresting means, said erasing machine and said printing device.

3. In a machine for erasing previously printed data from cards and printing in the areas left clear by such erasure, the combination of an erasing machine, comprising a rotary erasing member and a reciprocable member to press said cards against said rotary member, means to supply said rotary member with solvent fluid, a printing device, means for advancing said cards successively past said erasing machine and said printing device comprising means for arresting said cards at said erasing machine and at said printing device to erase an area and to print in registry with said erased area, and timed mechanism for operating said card advancing and arresting means, said erasing machine and said printing device.

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