C. FOSTER.

TABULATING MACHINE.

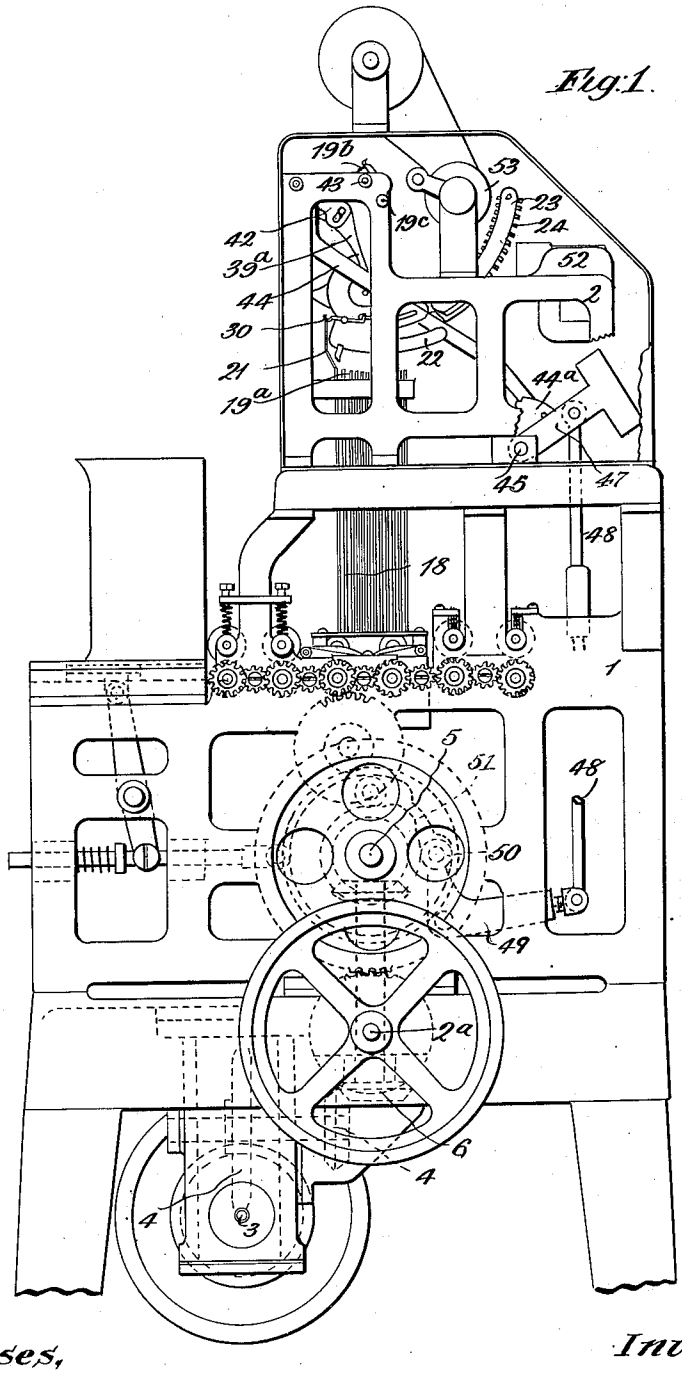
APPLICATION FILED SEPT. 18, 1917.

1,274,528.

Patented Aug. 6, 1918.

3 SHEETS—SHEET 1.

Fig. 1.



Witnesses,

Chas. E. Whiteman

H. D. Penney

Inventor:

Charles Foster,

By his Atty,

F. H. Richards.

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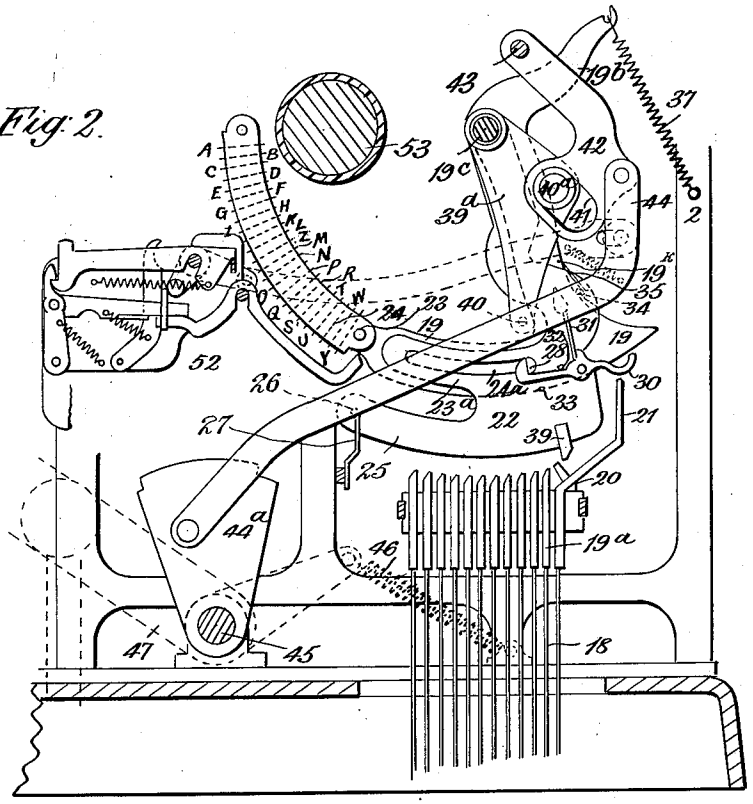
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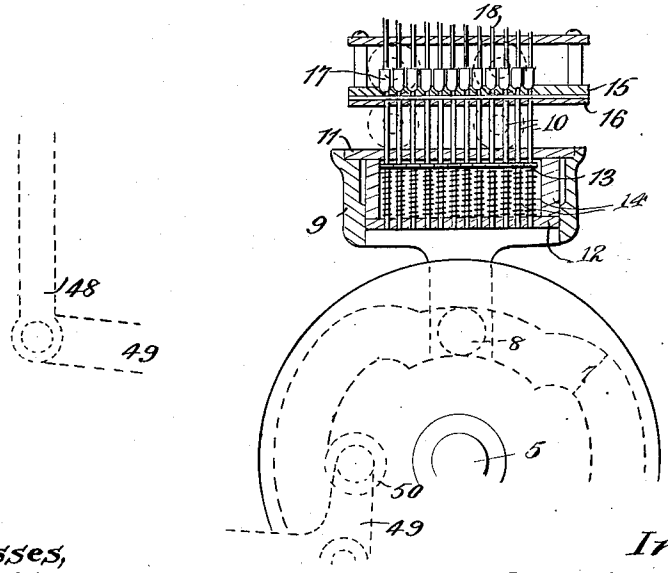
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3 SHEETS—SHEET 2.

Fig. 2.





Witnesses,
Chas. E. Whiteman.
H. D. Penny

Inventor:
Charles Foster,
By his Atty, F. A. Richards.

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3 SHEETS—SHEET 3.

Fig. 4.

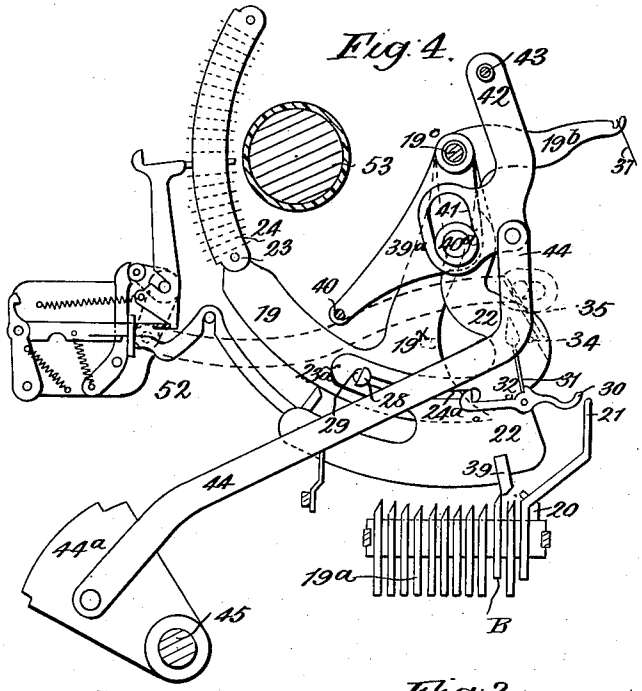
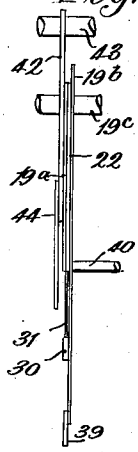


Fig. 5.



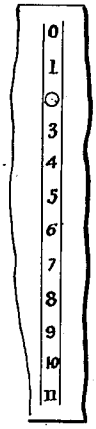
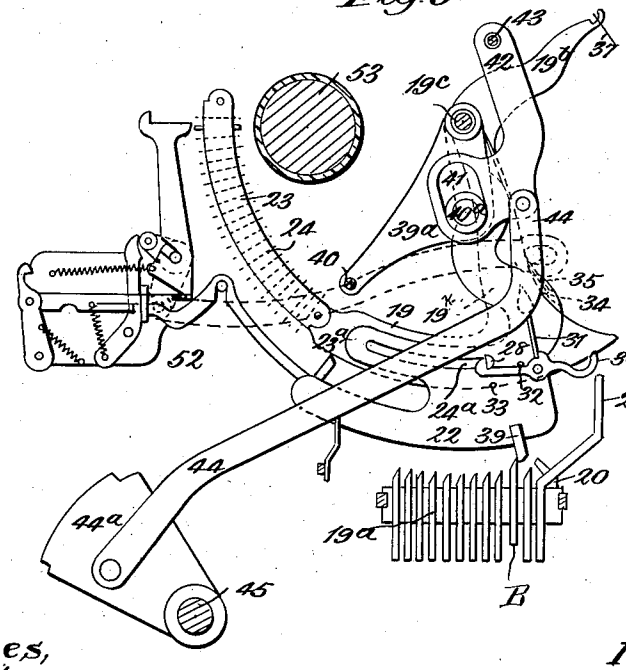


Fig. 6.

Fig. 3



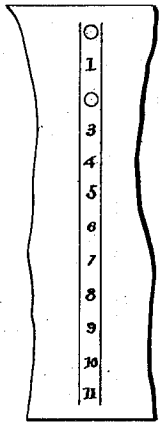


Fig. 7.

Witnesses,
Chas. F. Whiteman
H. D. Penney

Inventor:
Charles Foster,
By his Atty, F. H. Richards.

UNITED STATES PATENT OFFICE.

CHARLES FOSTER, OF CROYDON, ENGLAND, ASSIGNOR TO POWERS ACCOUNTING MACHINE COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

TABULATING-MACHINE.

1,274,528. Specification of Letters Patent. Patented Aug. 6, 1918.

Application filed September 18, 1917. Serial No. 191,930.

To all whom it may concern:

Be it known that I, CHARLES FOSTER, a subject of the King of Great Britain, residing in Croydon, Surrey, England, have invented certain new and useful Improvements in and Relating to Tabulating-Machines, of which the following is a specification.

This invention relates to improvements in and relating to tabulating machines.

It has already been proposed in the specification of British Letters Patent No. 2384 of 1915 to translate perforations in a card into alphabetical characters whereby groups of letters may be printed. In the case just referred to a card is employed having a field in which a limited number of perforations may be formed representing letters of the alphabet arranged in a single column and which perforations, by means of one or more additional perforations may be given a differential alphabetical meaning.

The present invention has for its object to provide improved mechanism designed to be operated by a card such as that just above referred to and in which, as distinguished from the known mechanism, in place of a spring actuated type drum controlled by a swinging sector the position of which is controlled by the aforesaid card acting upon settable stops, corresponding in number to the possible number of perforations in the alphabetical column, there is provided a swinging sector which sector itself carries the type, and is positioned by the settable stops. As in the prior case before referred to the settable stops may form part of a machine constructed in accordance with specification of British Letters Patent No. 26896 of 1913, and the sector may be operated in the manner and by the same means as the figure bearing sectors of the said machine.

In order, however, that the sector may accommodate the desired number of alphabetical characters, the number of possible perforations in the alphabetical column of the card and the number of settable stops remaining the same, in accordance with this invention, the type carrying portion is elongated to twice or approximately twice its ordinary length, and provision is made whereby either portion may be brought into the effective position.

In practice according to one form of the invention a swinging sector is employed constructed and operating substantially in the manner described in the aforesaid specification of British Letters Patent No. 26896 of 1913, said sector, however, being unprovided with teeth as it is not required to operate any counting mechanism. The sector just referred to is operatively associated with a second sector which corresponds substantially with the type sector of the aforesaid machine of the prior British Letters Patent No. 26896 of 1913 except that it is extended in length as already stated and that provision is made whereby without affecting the normal swing of the said sector either the main or extended portions may be brought into position so that the type hammer may act upon the selected type. The setting of the type sector is controlled by the first sector the movement of which in its turn is controlled by a series of settable stops acting upon a stop on said first sector. The two sectors are latched together so that they swing as one, the latch being controlled by the settable stop, which in the earlier patent represents the zero stop. The zero may in the present instance either be left blank or a letter may be placed on the sector at a point corresponding to this. The settable stops are in number equal to any possible perforation that may be formed in the column in the card and may be twelve in number. The type sector is provided with a slot in which works a pin on the swinging sector, whereby the forward movement of the said type sector is limited. The latch aforesaid may conveniently engage said pin so that when the said pin is engaged the forward part of the type sector may be brought into the operative position and when free of said latch and engaging the forward end of its slot, the rear portion of the type sector is in the operative position.

In order that the invention may be the better understood drawings are appended illustrating the application of the invention to a machine of the type forming the subject of the aforesaid British Letters Patent No. 26896 of 1913. It will be understood that one alphabetical sector and its attendant mechanism will be required for each letter that is to be printed in line on the record at one time. Thus assuming the whole alphabet to be required 26 of such sectors would be employed. In practice, however, it is usually possible, when surnames are

to be printed, to limit the number, so that the dimensions of a section or gang are not unduly large. As the construction and arrangement of each individual sector is the same whatever the number may be in the gang only one of such sectors and its attendant parts is illustrated and described.

In the accompanying drawings:—

Figure 1 is a side elevation of a machine embodying the present invention.

Fig. 2 is a side elevation to a larger scale showing the parts in their normal or unset position.

Fig. 3 is a similar view showing the parts in one printing position.

Fig. 4 is a similar view with the parts in another printing position.

Fig. 5 is a rear edge view of the printing sector and its controlling member.

Fig. 6 is a view showing the perforation in the card column designed to effect the setting shown in Fig. 3.

Fig. 7 is a similar view showing the perforations in the card column designed to effect the setting shown in Fig. 4.

In the accompanying drawings 1. indicates the lower frames of the machine and 2. the upper frames. 2^a indicates the driving shaft of the machine operated from a motor, not shown, by means of a worm 3. and worm wheel 4. see Fig. 1. 5. indicates the main shaft to which motion is transmitted from the shaft of worm wheel 4. by bevel gearing indicated generally by 6.

Mounted on the main shaft 5. are cams such as 7. which cams engage rollers 8. attached to a reciprocating pin box 9. in which pin box are arranged a number of pins 10. passing through guide plates 11, 12. The pins are each provided with a collar 13. upon which acts a spring 14. the tendency of which is to raise the pins said pins however being held down by the upper guide plate 11. which plate engages the collars 13 and forces the pins down against the action of their springs. Disposed above the pin box and rigidly fixed with respect thereto are two plates 15, 16. each plate being perforated the said perforations being in axial alinement with the aforesaid pins 10. The upper ends of the perforations in plate 15. are recessed and engaging said recesses are the lower ends of heads 17 secured to the lower ends of rods 18. to which are secured the stops 19^a. for positioning the printing sectors 19. In the example illustrated 12. settable stops 19^a are provided there being, as will be presently more fully explained, 12 positions in the card column where a perforation may be formed, see Figs. 6 and 7. 20. indicates a stop whereby the sectors 19. are held in the non-printing position. 21. indicates a stop by which as will be presently more fully explained the alphabetical type bearing sector is primarily positioned to permit the printing of certain characters. As the sectors for each letter are identical only one unit of a set is shown and described.

On reference to the drawings it will be seen that each unit comprises two sectors mounted on a shaft 19^c. one, that 19 already referred to and provided with an extension 23 carrying type, of which type only one, B is shown the remainder being indicated by the lines 24, and a second sector 22.

The sector 22. is provided with an extension 23^a slotted at 24^a. and also with a second extension 25. provided with a pin or projection 26. adapted when the parts are in the non-printing position to engage a stop 27 whereby the rearward movement of the sector 22. is limited. Projecting through the slot 24^a is a pin 28. having a head 29. which is so shaped as to form a detent designed to be engaged by the latch 30. which is maintained in the latching position by means of a spring 31. Stops 32, 33, are provided to limit the movement of latch 30. 34 indicates a projection upon sector 22, which by engaging the rear edge of the arm 19^k, of sector 19, serves to keep the two sectors 19, 22 in their normal relative positions. 35 indicates a spring mounted on sector 22, and which spring bears against the edge of the aforesaid arm 19^k, and the purpose of which is to cause a slight initial movement of the said sector 19, so that when free to move forward it is caused by the said spring to assume a position such that the latch cannot again engage the head 29. The sector 19 is provided with an arm 19^b. to which is secured one end of a spring 37 the opposite end of which is secured to some rigid body which may form part of or be secured to the frame 2 of the machine. The spring 37 acts to swing the sector 22 forward when released by the moving of the stop 20 out of the path of a second stop 39. upon sector 22. 40. indicates a restoring bar which bar normally occupies the position shown in Fig. 2. The bar 40. is carried by plates such as 39^a. pivotally mounted on the shaft 19^c. The bar 40. is caused to oscillate by means of the roller 40^a of which one is mounted upon the outer surface of each of plates 39^a. and which roller engages a slot 41. formed in a plate 42. mounted upon a shaft 43. The plate 39^a. is operated by means of a rod or bar 44. connected at one end to the said plate 42 and at the other end connected to a rocking plate 44^a on a shaft 45. said shaft being under the influence of a spring 46. The shaft 45. is operated by means of an arm 47. Fig. 2. which arm is connected to the upper end of a rod 48. connected to the bell crank lever 49. one arm of which is provided with a roller 50. engaging a cam 51. The impression of the type is effected by hammer mechanism indicated generally

by 52. with which is associated a platen 53. provided with an ink ribbon. As the construction and arrangement of the parts just referred to are all well known further description thereof is unnecessary.

As already explained, there are twelve possible positions for a perforation in each alphabetical column on the card and the character represented by each perforation is dependent not only upon its position in the said column but in the presence or absence of a perforation at the point indicated by the zero sign. Without a perforation at this point perforations at the points marked 1 to 11. represent the letters A to L. the letter I. serving also as J. With a perforation at the zero mark the significance of perforations at any one of the points 1 to 11 is altered and perforations at any one of the said points now represent according to their positions the letters M to Y. The perforation at the zero point may also be utilized and in itself represent a letter, for example the letter Z. The type corresponding to the respective letters of the alphabet are arranged upon the extension of sector 19 in the manner shown in Fig. 2 and they are each identified by the letter they represent. It is obvious however that the arrangement of the type in the manner shown is quite optional and its arrangement may be raised in any manner desired, it being understood that the positions of the various perforations in the alphabet column of the card will be correspondingly varied. As an example of the working of the invention it is assumed that it is desired to print the letter B. The perforation representing this letter is in the position 2 of the alphabet column see Fig. 6 and consequently the card when passing through the machine will raise the stop B as shown in Fig. 3. As the perforation at the zero point is absent, the raising of the B stop will simply free the sector from the stop 20 so that when the restoring bar 40 is swung into its outer position the sectors being latched together will move as one and when arrested by the B stop the B type will be in the position ready to be impressed upon the paper upon the operation of the hammer. The operation for any letter from A to L is the same the sectors being positioned by the appropriate stop. Assuming that the letter N is to be printed. In this case a perforation is provided at the zero point see Fig. 7. Consequently as the card passes through the machine the zero stop is raised and contacting with the end of latch 30 raises the same and frees the sector which under the influence of its spring moves slightly forward and as already explained carries the pin 28 clear of the latch. Simultaneously with the raising of the zero stop the stop which before represented the letter B is raised and the sector is free to swing outward until arrested by the said B stop. As the type sector is now free of the latch it will move forward until its movement is checked by the pin 28 reaching the end of slot 24 and when in this position the N type will be in a position ready to be struck by the hammer. The position of the parts will then be as shown in Fig. 4. The operation will be the same for any of the letters N to Y the letters X and V being omitted, the position of the sector being determined by the particular stop which has been raised. The letter L will be printed only if a perforation is formed in the zero position of the card without any other perforation in any of the remaining positions in which case the type sector will swing to the full extent of its outward movement without any corresponding movement of the sector 22.

The parts in each case are restored after the printing has been effected by the restoring bar. It will thus be seen that by means of the arrangement according to this invention I am enabled to effect the printing of practically the whole of the alphabet without unduly increasing either the number of stops or employing a number of perforations beyond the limits of the column of an ordinary card. It will be understood that the cards will be provided with a number of alphabet columns equal to the number of letters it is desired to use. Thus supposing surnames are to be printed the number of columns provided would be equal to the number of the letters required for the longest name. Assuming that 9 letters is the contemplated maximum number then only 9 letter columns would be provided.

While I have described the invention as particularly designed for the translation of perforations into alphabetical characters, it may be advantageously employed for the production of any other ciphers or numerals and it may with particular advantage be employed to reduce the number of columns necessitated where very large amounts are to be indicated. For example for tens of thousands up to a known amount say 20,000.

In machines as ordinarily constructed it would be necessary to employ four columns upon the cards and four sectors to print values up to 9,000, and five columns and five sectors for an amount up to 20,000. By providing the sectors arranged in accordance with this invention with type representing compound members it is possible by employing only four sectors to accomplish results which as above explained under ordinary circumstances require five columns and five sectors. Thus for example instead of the alphabetical type, figure types would be employed representing 1 to 20 or thereover according to the number of type which would be carried by the sector. Obviously the arrangement and construction of the

extensions upon the sectors may be varied as may be found in practice to be necessary or desirable.

Claims:

1. In a tabulating machine operated by a perforated card a swinging type bearing member having a number of type thereon greater in number than the number of possible perforations in a column of the card and means operated by said card to position the swinging member to bring the desired type into the printing position.

2. In a tabulating machine operated by a perforated card a swinging type bearing member having a number of type thereon greater in number than the number of possible perforations in a column of the card, a second swinging member controlling the movement of the type sector, means for connecting said sectors, and means operated by said card to release the swinging type bearing member to permit its adjustment to bring the desired type into the printing position.

3. In a tabulating machine operated by a perforated card, a swinging type bearing member having a number of type thereon greater in number than the number of possible perforations in the column in the card, a second swinging member, stops set by the card for positioning said second member a connection between the type bearing member and the second swinging member and means for disconnecting said type bearing member from the swinging member controlled by the card whereby the said type bearing member is free to move independently of its controlling member in order to bring the desired type into the printing position.

4. In a tabulating machine operated by a perforated card a swinging type bearing member having a number of type thereon greater in number than the number of possible perforations in the column of the card, a second swinging member, stops controlled by the card for positioning said second swinging member, a spring controlled latch upon the second swinging member, a stud upon the type bearing member engaging said latch and means controlled by the card for releasing said latch whereby it may be positioned independently of the second swinging member to bring the desired type into the printing position.

5. In a tabulating machine operated by a perforated card a swinging type bearing member having a number of type thereon greater in number than the number of possible perforations in the column of the card, a second swinging member, stops controlled by the card for positioning said second swinging member, a spring controlled latch upon the second swinging member, a stud upon the type bearing member engaging said latch and means controlled by the card for releasing said latch whereby it may be positioned independently of the second swinging member to bring the desired type into the printing position, and means for giving a slight initial movement to the type bearing member whereby the accidental reengagement of the latch before the operation of the type bearing sector is avoided.

6. In a tabulating machine operated by a perforated card a swinging type bearing member having a number of type thereon greater in number than the number of possible perforations in the column of the card, a second swinging member, stops controlled by the card for positioning said second swinging member, a spring controlled latch upon the second swinging member, a slot in the second swinging member a stud on the type bearing member projecting through said slot and engaging said latch whereby it may be positioned independently of the second swinging member to bring the desired type into the printing position.

7. In a tabulating machine operated by a perforated card a swinging type bearing member having a number of type thereon greater in number than the number of possible perforations in the column of the card, a second swinging member, stops controlled by the card for positioning said second swinging member, a spring controlled latch upon the second swinging member, a slot in the second swinging member a stud on the type bearing member projecting through said slot and engaging said latch whereby it may be positioned independently of the second swinging member to bring the desired type into the printing position, and means for giving a slight initial movement to the type bearing member whereby the accidental reëngagement of the latch before the operation of the type bearing sector is avoided.

In testimony whereof I affix my signature in the presence of two witnesses.

CHARLES FOSTER.

Witnesses:
H. A. Ball,
C. F. Hopwood, Jr.