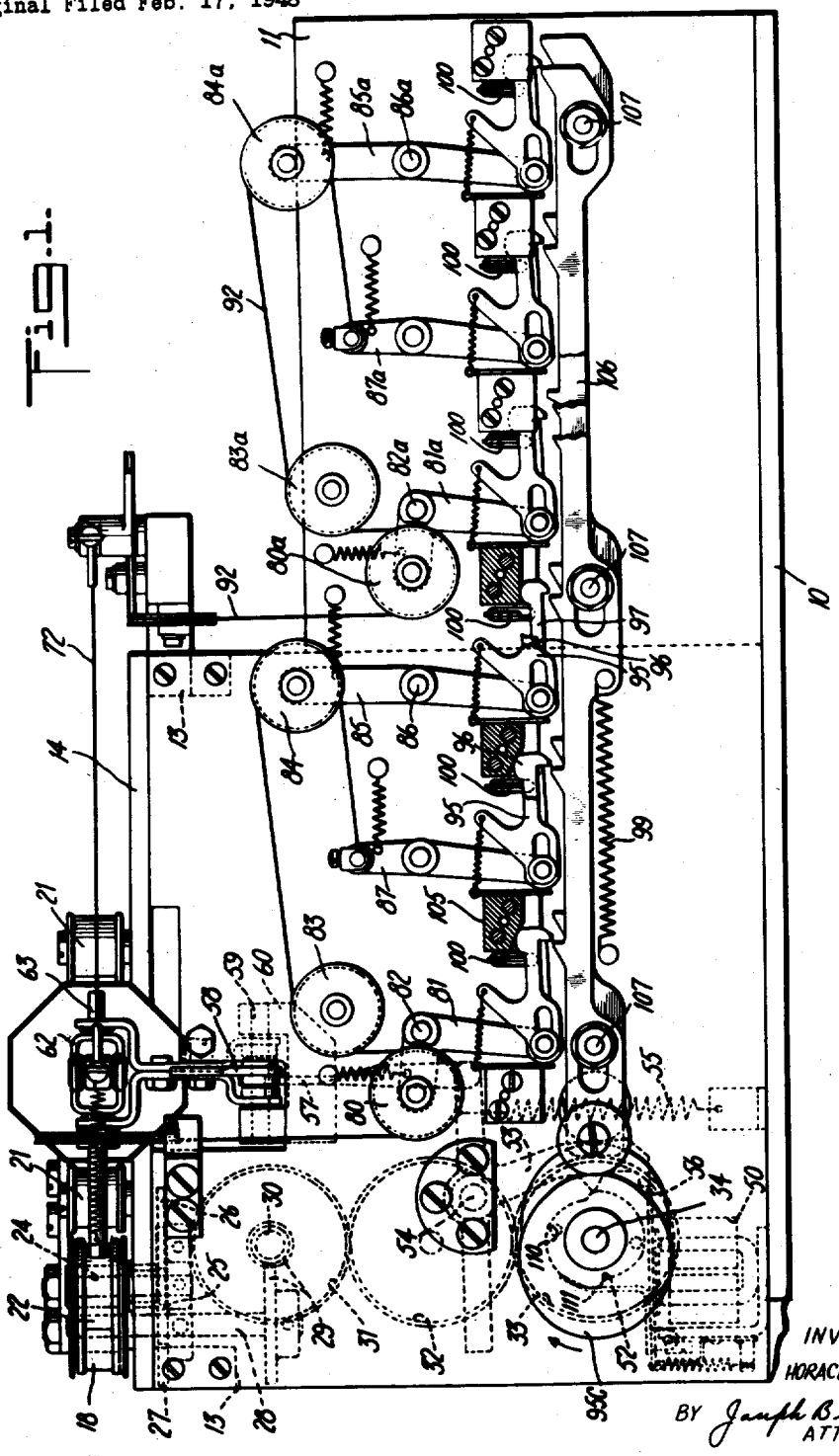
March 20, 1956 H. S. BEATTIE Re. 24,131

HIGH SPEED PRINTING MECHANISM

Original Filed Feb. 17, 1948 7 Sheets-Sheet 1

Fig. 1.



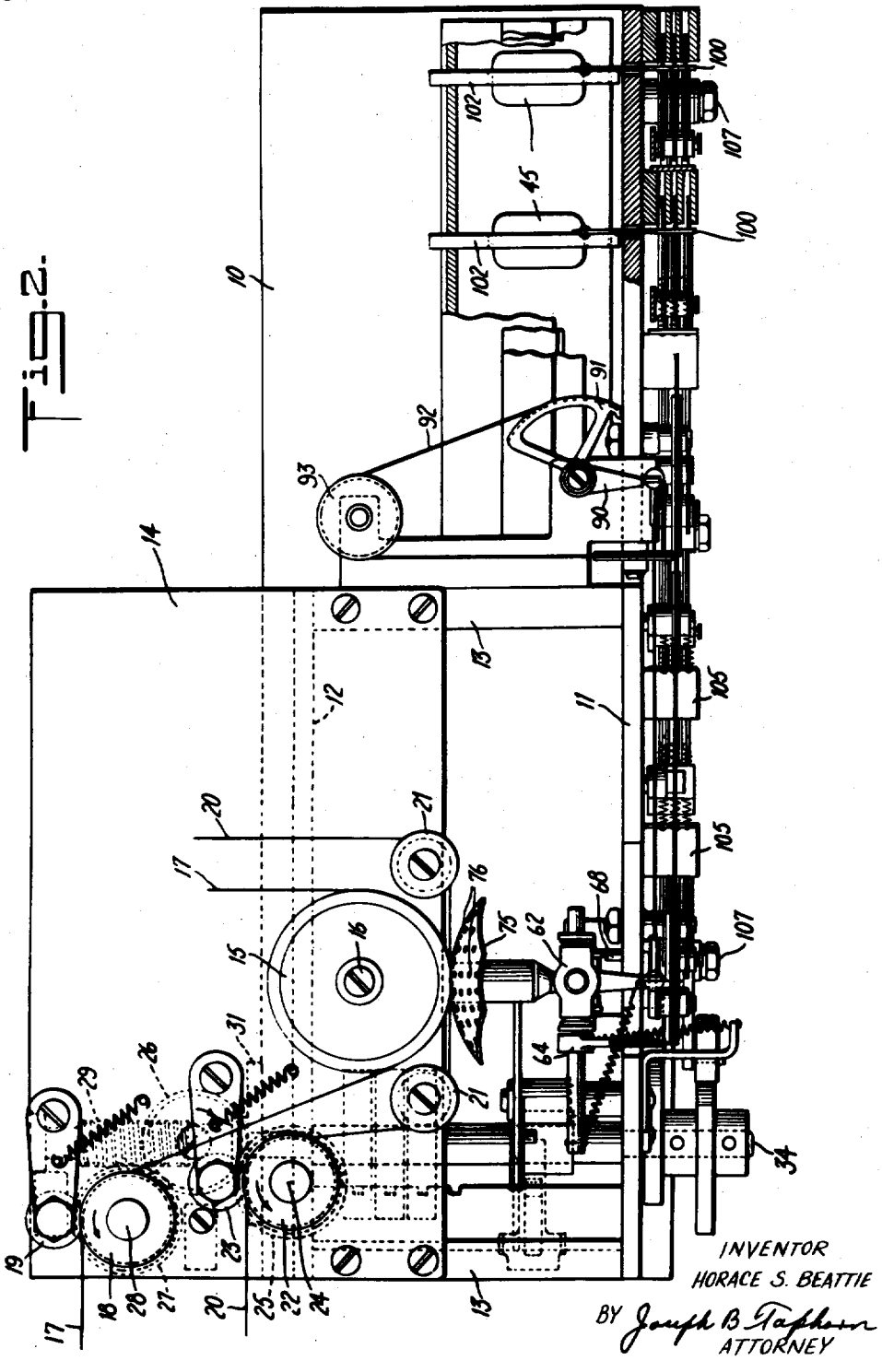
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HIGH SPEED PRINTING MECHANISM

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Fig. 2.



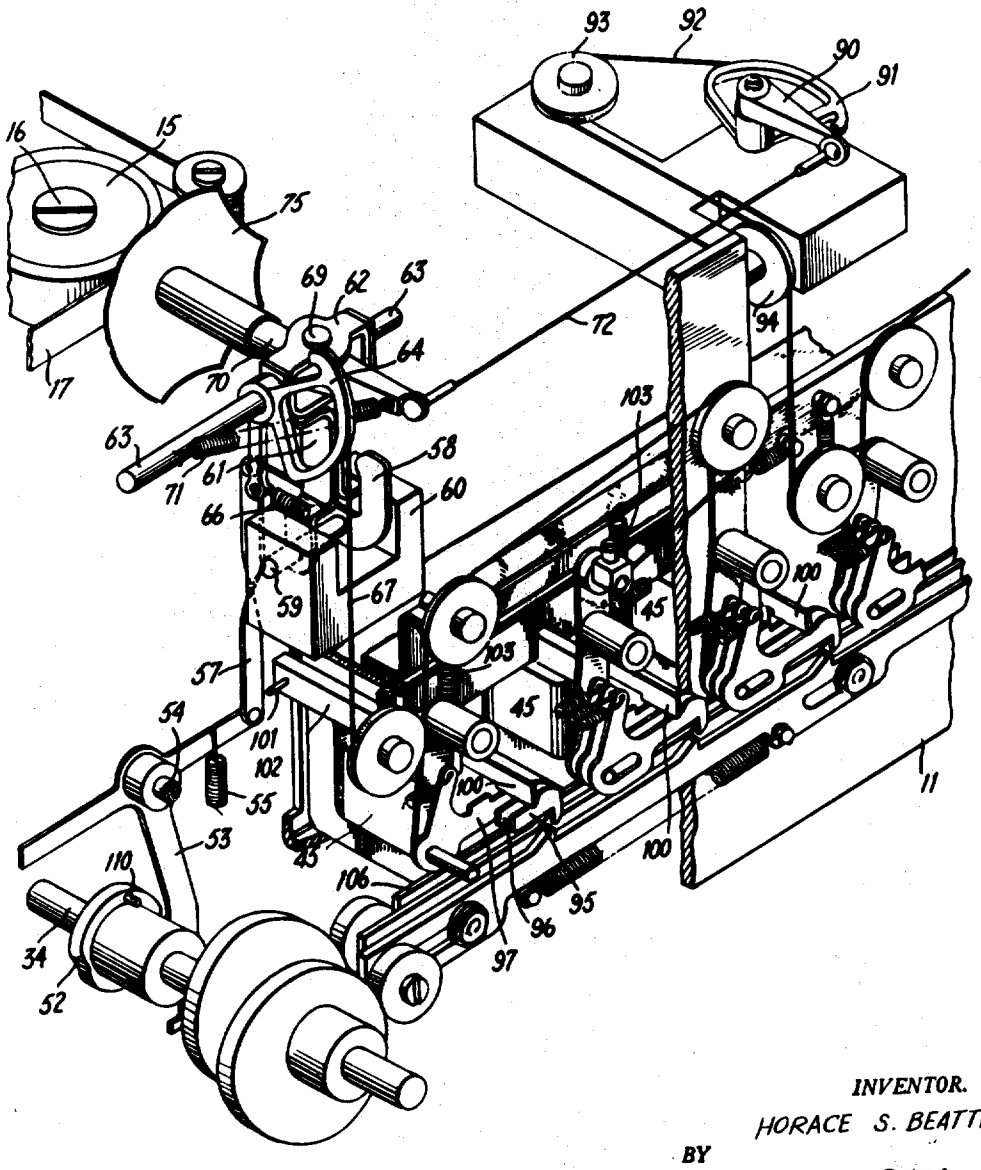
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HIGH SPEED PRINTING MECHANISM

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Fig. 3.



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HIGH SPEED PRINTING MECHANISM

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Fig. 4.

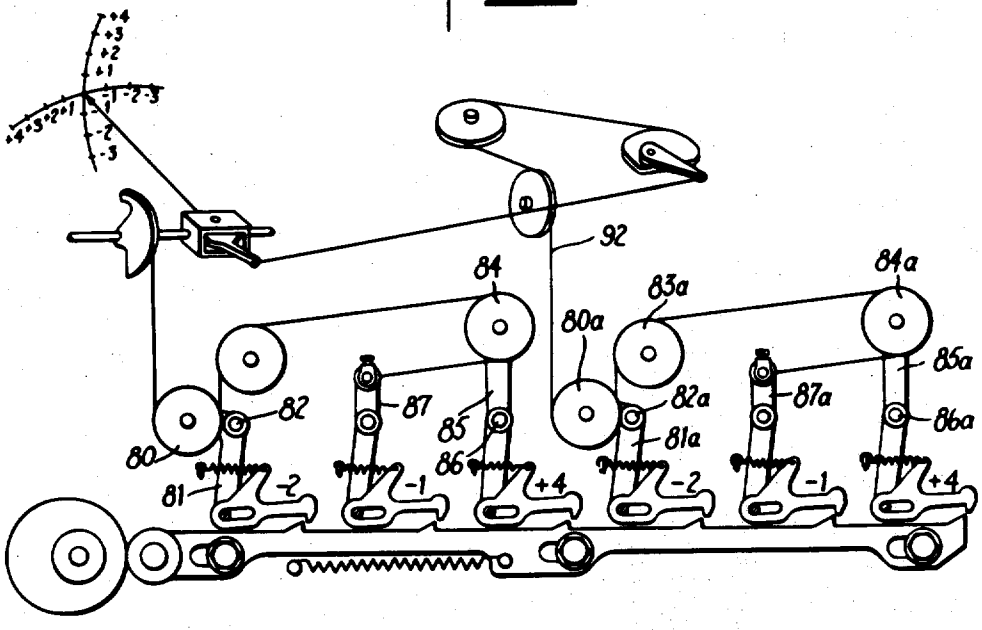
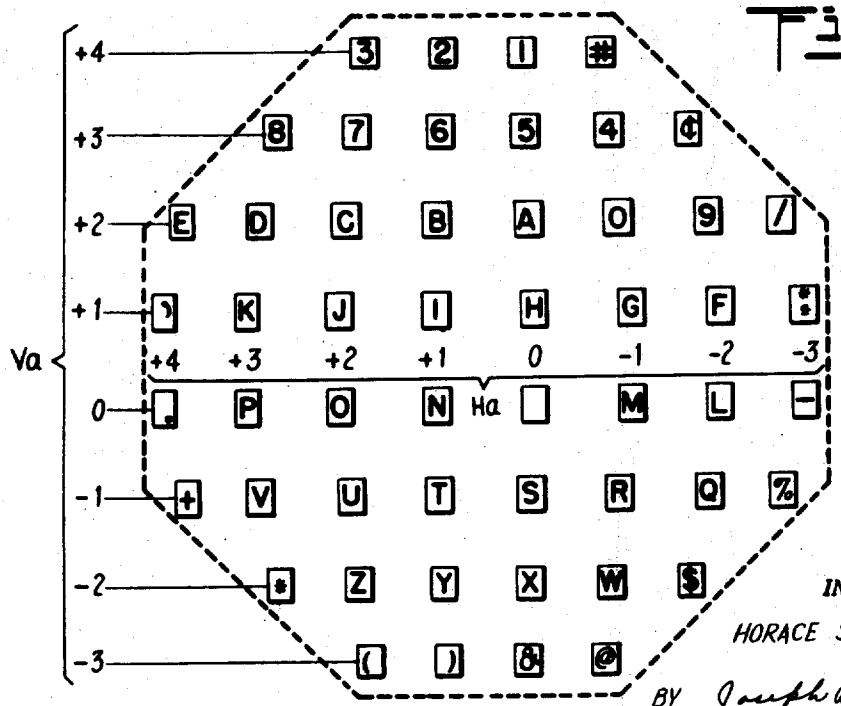


Fig. 5.



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HIGH SPEED PRINTING MECHANISM

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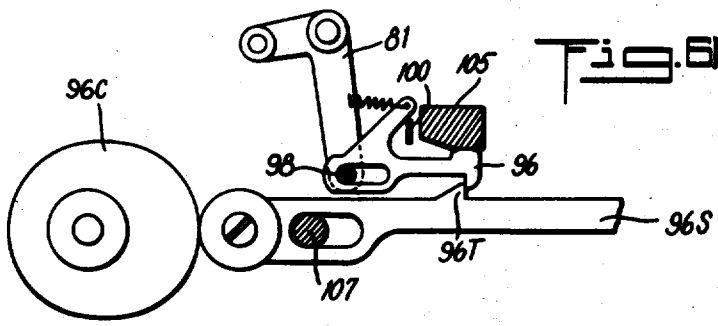


Fig. 6b.

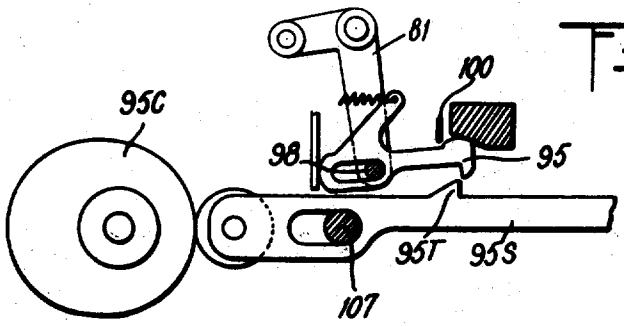


Fig. 6a.

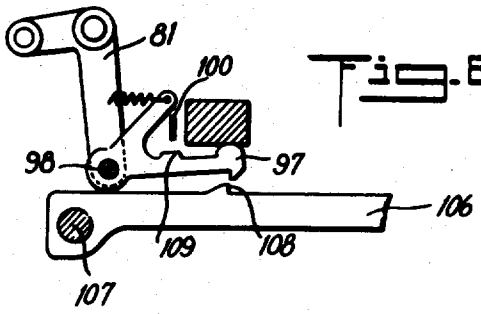


Fig. 6.

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HIGH SPEED PRINTING MECHANISM

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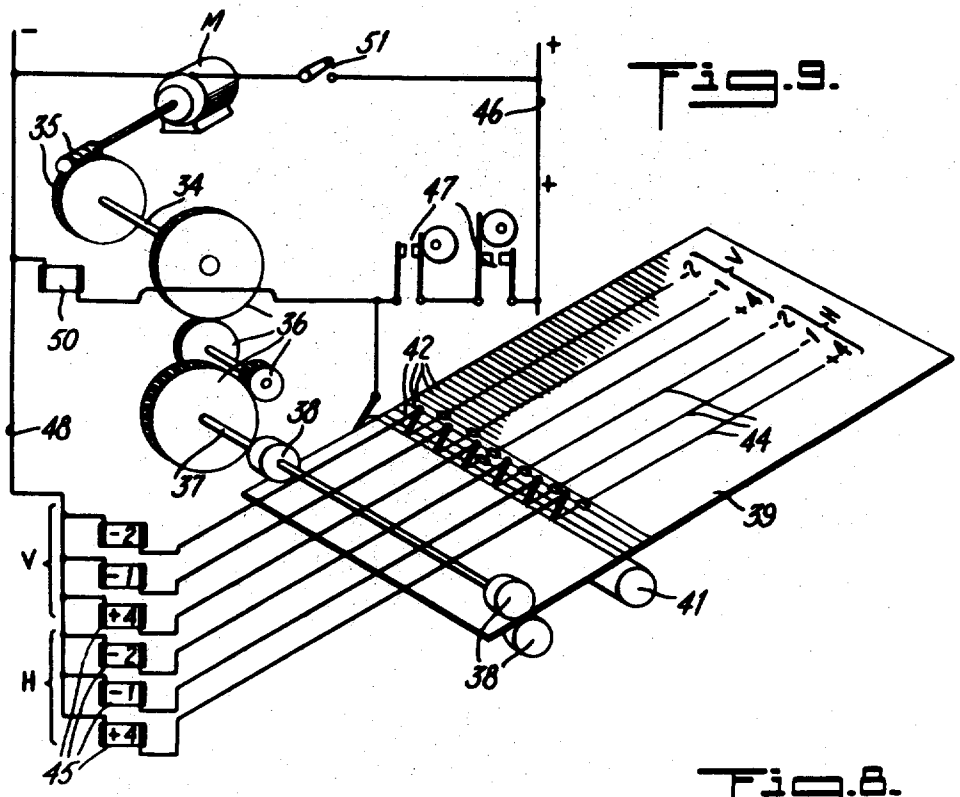


Fig. 9.

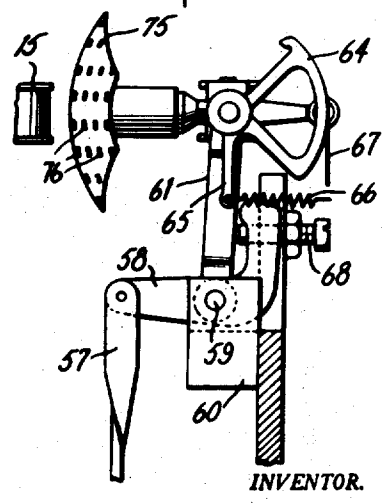


Fig. 8.

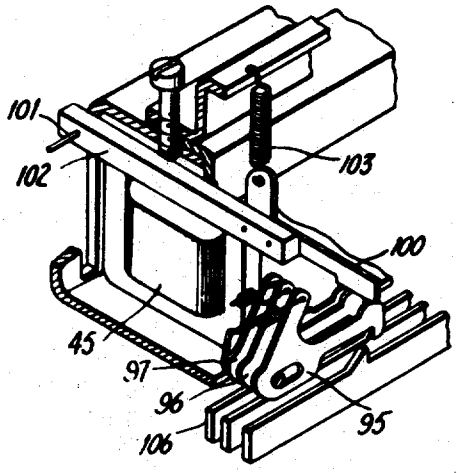


Fig. 7.

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HIGH SPEED PRINTING MECHANISM

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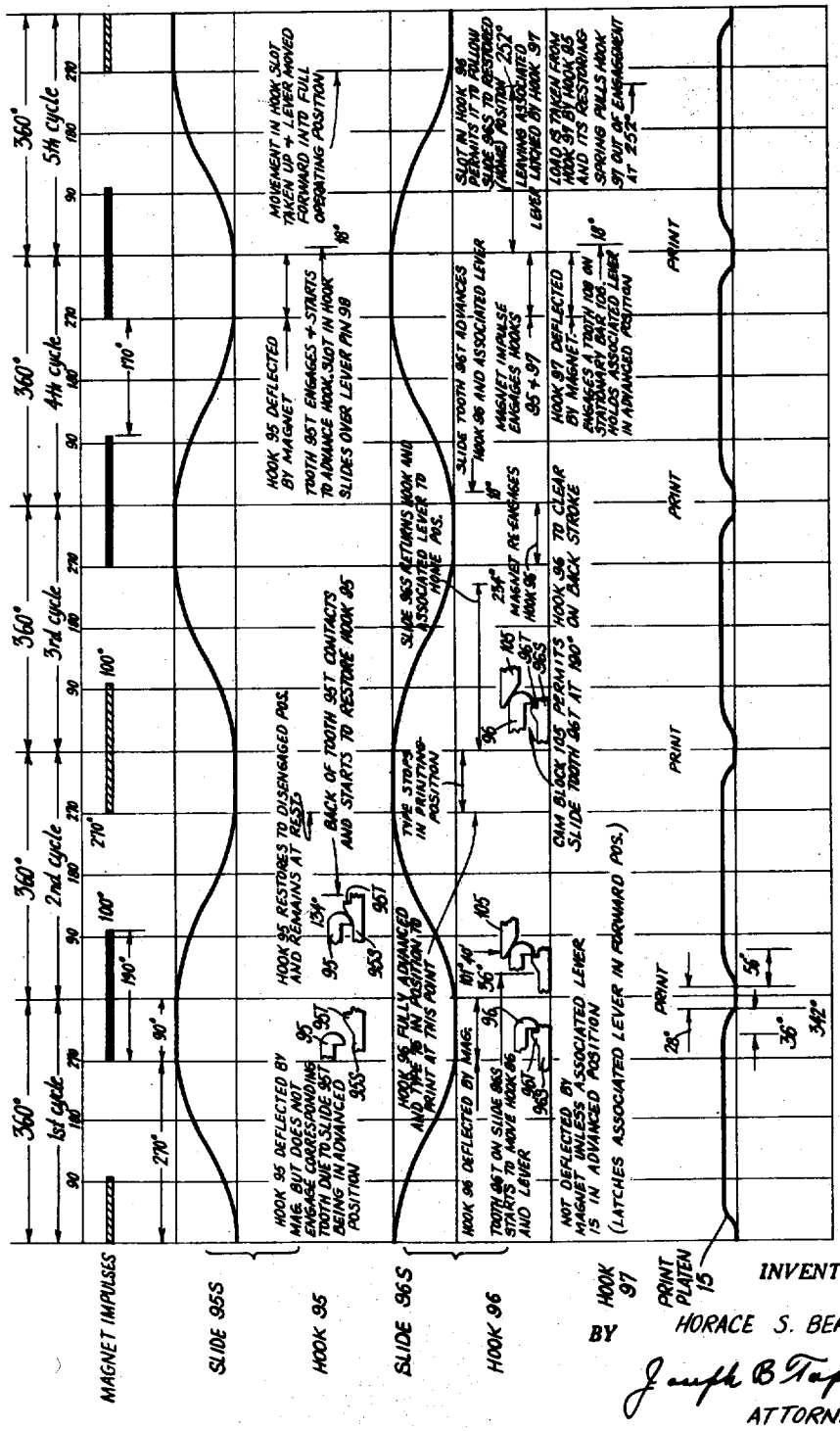


Fig. 10.

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United States Patent Office

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24,131

HIGH SPEED PRINTING MECHANISM

Horace S. Beattie, Dutchess County, N. Y., assignor to International Business Machines Corporation, New York, N. Y., a corporation of New York

Original No. 2,661,683, dated December 8, 1953, Serial No. 8,929, February 17, 1948. Application for reissue March 14, 1955, Serial No. 494,303

22 Claims. (Cl. 101—93)

Matter enclosed in heavy brackets [ ] appears in the original patent but forms no part of this reissue specification; matter printed in italics indicates the additions made by reissue.

This invention relates to printing devices and more particularly to printing devices controlled by designations in a record to print a succession of characters.

The principal object of the invention is to provide a novel high speed printing apparatus in which a plurality of characters are spaced in columns and rows on the surface of the segment of a sphere whose spheric center is located opposite a printing point past which a receiving strip or sheet is fed. To select a character for printing, the segment is tilted to bring the desired character opposite the printing point. Thereafter, the segment with its center is thrown bodily against the paper to make an impression thereon of the selected character.

A more specific object of the invention is to provide a simple control mechanism for selectively positioning the spherical segment so that it moves directly from one character to the next without returning to its initial position.

A still further object of the invention resides in the provision of a record sensing mechanism for sensing character designations in a record card or strip in successive order and during uninterrupted movement of the strip with the character selecting devices coordinated so that each succeeding designation is sensed while an impression is being taken in accordance with the preceding selection.

Other objects of the invention will be pointed out in the following description and claims and illustrated in the accompanying drawings, which disclose, by way of example, the principle of the invention and the best mode which has been contemplated of applying that principle.

In the drawings:

Fig. 1 is a front elevation of the apparatus.

Fig. 2 is a plan elevation of the apparatus.

Fig. 3 is an isometric view showing part of the character selecting mechanism with the connections to the impression elements.

Fig. 4 is a diagram of the scheme of connections.

Fig. 5 is a diagram showing the arrangement of the characters on the impression element looking toward the platen.

Figs. 6, 6a, and 6b are detail position views of parts of the selected mechanism.

Fig. 7 is an isometric view of one of the selecting magnets and associated devices.

Fig. 8 is a detail of the type carrier and its supporting elements.

Fig. 9 is a wiring diagram with the record sensing mechanism incorporated therein.

Fig. 10 is a chart depicting the timing of various components of the apparatus.

Referring to Figs. 1 and 2, the apparatus is supported on a base 10 to which is secured a vertical front plate

11 and back plate 12 tied together by cross bars 13. The top plate 14 fastened to cross bars 13 supports the paper and ribbon mechanism. The printing platen is represented at 15 (Fig. 2) and is rotatable on a stud 16 in plate 14. A paper strip 17 is fed from a suitable supply roller around the platen and between a feed roller 18 and spring-pressed follower 19. An ink ribbon 20, fed from a suitable source, is guided across the platen in front of the paper strip 17 by guide rollers 21 and is advanced by a feed roller 22 and spring pressed follower 23.

Rod 24 upon which roller 22 is secured, carries a gear 25 (see also Fig. 1) which through an idler 26 meshes with a similar gear 27 on the rod 28 supporting paper feed roller 18. The rod 28 has worm and wheel connection 29 with a shaft 30 which carries a gear 31 meshing with an idler 32 which in turn meshes with a gear 33 secured to main drive shaft 34. This shaft is continuously driven, and through the chain of gearing traced, it will be noted that with the shaft 34 in motion the paper strip 17 and ink ribbon 20 move with a continuous uninterrupted motion.

Referring to Fig. 9, shaft 34 is diagrammatically represented as driven from a motor M through reduction gearing 35. Through further gearing generally designated 36 a shaft 37 is driven and this, through rollers 38, serves to feed a record card 39 past a row of sensing brushes 40 and contact roller 41 with a continuous movement.

The record card 39 is provided with columns designated 42 in which perforations 43 are combinationally made in six rows designated 44 to represent different characters. Rows 44 are divided into an upper set of three designated V and a lower set of three designated H with the individual rows in the sets designated as −2, −1, and +4.

The following Table I lists the characters that may be represented and the particular perforation combinations for each. Thus, for example, the numeral 2 is represented by holes in the +4 row of field V plus holes in all three rows of field H.

TABLE I

	V			H		
	−2	−1	+4	−2	−1	+4
#			X		X	
1			X			
2			X	X	X	X
3			X	X		X
4		X	X		X	
5		X	X			
6		X	X	X	X	X
7		X	X	X		X
8		X	X		X	X
/	X		X			
9	X		X	X	X	
0	X		X		X	
A	X		X			
B	X		X	X	X	X
C	X		X	X		X
D	X		X		X	X
E	X		X			X
F	X	X	X	X	X	
G	X	X	X	X		
H	X	X	X		X	
I	X	X	X			
J	X	X	X	X	X	X
K	X	X	X	X		X
,	X	X	X		X	X
L				X	X	
M				X		
N				X	X	X
O				X		X
P					X	X
%		X		X	X	X
Q		X		X		
R		X			X	

Table I.—Continued

	V			H		
	−2	−1	+4	−2	−1	+4
S		X				
T		X		X	X	X
U		X		X		X
V		X			X	X
+		X				X
$	X			X		
W	X				X	
X	X					
Y	X			X	X	X
Z	X			X		X
*	X				X	
@	X	X			X	
&	X	X				
)	X	X		X	X	X
(	X	X		X		X

Each sensing brush **40** is connected to one of a group of magnets **45** which are designated to identify them with the rows with which each is associated. Thus, as the card passes brushes **40**, the magnets **45** will be repeatedly energized in combinations corresponding to the perforation arrangement. The circuit extends from current line **46**, through cam controlled contacts **47** (operated by cams on shaft **34**), contact roller **41**, holes in the card, brushes **40**, magnets **45** to opposite line **48**.

The gear ratio between shafts **34** and **37** is such that one column **42** of the card passes the line of brushes for each half revolution of shaft **34**, and the contacts **47** are adjusted to repeatedly make and break the circuits while the columns are sensed.

A print magnet **50** is wired to contacts **47** so that it is energized once each half cycle of shaft **34** in time with the period of energization of magnets **45**. In the operation of the device, card **39** is placed in position as diagrammatically shown with brushes **40** in advance of the first column of perforations. Thereafter, switch **51** is closed to supply current to motor M and shaft **34** will be driven to advance the card *and* contacts **47** will complete the sensing circuits and concurrently energize the print magnet **50**.

Referring now to Figs. 1 and 3, shaft **34** has secured thereto a cam **52** which cooperates with a bell crank follower lever **53** pivoted at **54** and normally biased by a spring **55** in a clockwise direction. The lower extremity of the lever is engaged by armature **56** of magnet **50**, so that with the magnet deenergized, the lever is restrained against following the contour of the cam. Upon energization of magnet **50** with the parts in the relative position shown in Fig. 1, lever **53** is rocked by spring **55** to turn clockwise under control of the cam **52** and will draw a link **57** downwardly. Pins **110** in cam **52** serve to engage a finger **111** extending from armature **56** to restore the latter. The link **57** connects with a hammer **58** pivoted freely on a rod **59** supported by a block **60** secured to plate **11**.

The rod **59** supports a vertical lever **61** (see Fig. 8) whose upper end carries a cage **62** having integral rods **63** extending through holes in the lever **61**, so that the cage may oscillate in a vertical plane. Secured to one of the rods **63** is a pulley segment **64** with a finger **65** upon which a spring **66** acts to urge the segment in a counterclockwise direction. A cable **67** through selecting mechanism yet to be described, will draw the segment clockwise or will slacken to allow spring **66** to rock the segment counterclockwise. In the normal position of the parts as in Fig. 8, spring **66** acting through segment **64** urges lever **61** clockwise against a limit stop pin **68**. Accordingly, when magnet **50** is energized, cam **52** will rock hammer **58** against the lever **61** to rock the latter in a counterclockwise direction.

Cage **62** has a vertical rod **69** therein to support a stem **70** which may thus oscillate in a horizontal plane about rod **69**. A spring **71** extending between rod **63** and stem **70** (Fig. 3) biases the stem in one direction and a cable **72** through the selector mechanism may pull the stem in the opposite direction against the spring action or may slacken to allow the spring to rock the stem.

From the foregoing, it will be noted that a so-called universal joint is provided with the point of intersection of the axes of rods **69** and **63** constituting a point about which stem **70** can be rocked in any direction. The left end of stem **70** (as viewed in Figs. 3 and 8) has secured thereto a type carrier or head **75** which has a spherical surface whose spherical center is the point of intersection of the axes of rods **69** and [**33**] *63*. The stem **70** lies normally in the plane of platen **15**, and as the stem is rocked universally, any point on its surface may be brought into the plane of the platen or more specifically into a line extending from the pivot point to the axis of the platen. Accordingly, if the carrier is so positioned and hammer **58** is then actuated, the presented point of the carrier will be impelled toward the platen and against the ribbon and paper therebetween.

A plurality of type characters **76** are disposed on the surface of the carrier **75** arranged vertically in great circles and longitudinally in chordal circles as shown in Fig. 5. In this figure the characters are viewed looking toward the platen and in normal or rest position a blank space directly below the character H is in line with the platen so that, if the hammer is actuated with the carrier in such position, no printing will take place.

To select a character for printing, the carrier is shifted up or down and right or left from its normal position to bring the character into the position initially occupied by the blank type element.

The horizontal rows or chordal circles are designated Va and the vertical columns or great circles are designated Ha, while the individual rows and columns are designated +4, +3, +2, +1, 0, −1, −2, and −3. These designations correspond to punching positions in the rows and columns of the record card wherein, if for the V and H fields the designated values for any character are algebraically added, the result will represent the extent of vertical and horizontal movement of the carrier to present the related type for printing such characters. For example, the letter B (see Table I) is represented by V values −2 and +4 and by H values −2, −1, and +4. Combining these algebraically, V equals +2 and H equals +1. Turning to Fig. 5, it is seen that the letter B lies at the intersection of the +2 chordal circle ordinate Va and the +1 great circle ordinate Ha, so that to present letter B for printing the carrier is to be shifted one column to the right and two rows down. In a similar manner, other characters may be inspected and from Table I the extent and direction of movement of the carrier may be determined to present such characters to the printing position.

Vertical positioning mechanism.—There is provided a separate mechanism for effecting the vertical positioning and this will be first described. Referring to Figs. 1, 3, and 4, the cable **67** extends from segment **64** around a grooved wheel **80** mounted on an [armature] *arm* of bell crank **81** pivoted at **82**, thence around a wheel **83** pivoted on the fixed plate **11**, thence around a wheel **84** mounted on a lever **85** pivoted at **86** and thence to the upper end of a lever **87** to which it is secured.

The levers **81**, **87**, and **85** are all spring biased in a clockwise direction and may be rocked singly or in combination through the same angle in a counterclockwise direction. The parts are so proportioned that, if lever **85** is rocked alone, cable **67** will be slackened *to allow spring 66* to rock the carrier vertically to bring its +4 line of characters along the printing line. If lever **87** is rocked alone, cable **67** will be [given slack so that its spring **66** will] *tighten to* rock the carrier vertically to bring its −1 row to the printing line. If lever **81** is rocked alone, cable **67** will be [given sufficient slack so that spring **66** will] *tightened to* rock the carrier vertically to bring its

−2 row to the printing line. Obviously, when the levers are rocked in combination the remaining rows will be selected. Thus,

To select row Va	Levers rocked
+3	85 (+4), 87 (−1)
+2	85 (+4), 81 (−2)
+1	85 (+4), 81 (−2), 87 (−1)
−3	[4] 81 (−2), 87 (−1)

Horizontal positioning machines.—Cable **72** (Figs. 1, 3 and 4) connects at its right end to an arm **90** integral with a segment **91** from which a cable **92** extends around wheels **93** and **94** and thence around a system of wheels corresponding to the system around which cable **67** extends. The components of this latter system are identified by the same numerals as corresponding parts for cable **67**, but distinguished by the letter a suffixed thereto.

In the same manner the levers **81a**, **87a**, and **85a** are related to the values −2, −1, and +4, respectively, and again rocking of the levers through the same angle singly or in combination will rock the carrier in a left or right direction to select an appropriate column of the carrier. Thus,

To select column Ha	Levers rocked
+4	85a (+4)
+3	85a (+4) 87a (−1)
+2	85a (+4), 81a (−2)
+1	85a (+4), 81a (−2), 87a (−1)
−1	87a (−1)
−2	81a (−2)
−3	81a (−2), 87a (−1)

Each of the levers **81**, **87**, **85**, and its counterpart **81a**, **87a**, and **85a** has pivoted thereto at its lower extremity a pair of identical interposer hooks designated **95** and **96** and a latching hook **97**. These hooks are shown separately in Figs. 6, 6a, and 6b where it is seen that hooks **95** and **96** are slotted for sliding action on a pin **98** in the end of lever **81** (in example) while hook **97** is not slotted. All the hooks are spring biased in a counterclockwise direction.

The six hooks **95** lie in a common plane and in the plane of a slide **95S** which is mounted for horizontal reciprocation on posts **107**. Spring **99** serves to move it to the left while a cam **95C** shifts it to the right. There is a tooth **95T** for each hook **95** proportioned so that as shaft **34** rotates, slide **95S** will reciprocate its teeth **95T** below the hooks and, if a hook is rocked about its pin **98**, the hook will be engaged and therebetween the related lever **81** (for example) will be forcibly rocked through a predetermined angle.

The six hooks **96** also lie in a common plane and in the plane of a slide **96S** which is mounted in the same manner as slide **95S** and is actuated by a cam **96C** on shaft **34** which has the same configuration as cam **95C** but is mounted on the shaft with a 180° displacement, so that slides **95S** and **96S** are reciprocated oppositely. Slide **96S** has a tooth **96T** for each hook **96** and, if one of these hooks is rocked, it will be engaged by a related tooth to rock the related lever counterclockwise.

The mechanism for rocking hooks **95**, **96** comprises a lever **100** (Figs. 3 and 7) of which there is one provided for each of the six sets of hooks (see Fig. 1). This lever is pivoted at **101** and is integral with armature **102** of a magnet **45** and is biased upwardly by a spring **103**. The magnets **45** are selectively energized as explained in connection with the circuit of Fig. 9.

The sequence of operations is as follows. When a perforated column **42** of the record card **39** is beneath the sensing brushes **40**, contacts **47** close to complete circuits to magnets **45** in accordance with the coding of the character sensed and the corresponding levers **100** will be rocked to tilt the related hooks **95**, **96**. Shortly thereafter, one or another of the slides **95S**, **96S** will move

to the right, engage and carry with it the tilted hooks and connected levers. These, through the differential pulley wheel and cable connections to the carrier will thereupon rock the carrier selectively in the appropriate direction to present the character corresponding to the combination of holes sensed to the printing line, and at such time while the advanced slide **95S** or **96S** is in its extreme position, cam **52** will trip the hammer **58** to throw the carrier against the platen and effect an impression on the tape.

It will be noted in Fig. 6b that as a hook (**96**) is advanced by a tooth in its related slide the free end of the hook slides beneath a stationary block **105** which locks the hook in engagement with tooth **96T** and enables restoration of lever **100** shortly after slide **96S** has begun to move.

When the advanced slide is in its extreme position and just before it begins to return, the circuit through the controlling card column will have been broken and the next column will be at the sensing brushes. The alternate slide will be about to begin its advance and circuits will be completed to the magnets **45** in accordance with the combinational punching in this next card column to rock a new set of hooks accordingly for advance by the alternate slide, while those previously advanced return as the first slide moves to the left.

Provision is made so that, where a selected and advanced hook is again selected in response to the sensing of the next card column, such hook is not restored but is caused to remain in advanced position. For this purpose a bar **106** (Figs. 1, 3, and 6) is provided which is fixedly mounted on posts **107** and has teeth **108** lying in the plane of movement of the latching hooks **97**. When any lever (such as **81**) is rocked, it will advance its hook **97** to the position of Fig. 6 wherein a raised shoulder **109** will lie beneath lever **100**. If now the same advanced lever is to be selected for the card column, i. e., in the next ½ revolution of the shaft **34**, the related lever **100** will be actuated with hook **97** in the position of Fig. 6 and the hook will be tilted to engage adjacent tooth **108** in bar **106**. This latching action takes place while the second slide is advancing and is maintained by frictional engagement of the hook **97** with tooth **108**, since at such time lever **81** is spring biased clockwise and exerts a leftward pull on the hook. A slight undercutting of tooth **97** serves to assist in maintaining the latched relationship until the newly advanced hook **95** or **96** picks up the lever and gives it a slight overthrow sufficient to release the contact between **97** and **108**.

The net effect of this latching action is to obviate the return of the carrier to home position between successive printing operations and, where the same character is punched in successive columns, the carrier will be positioned upon the first sensing of the character and then latched in such position for repeated printing therefrom.

Obviously, where the next character lies in the same row or column, that row or column will have its selecting connections latched so that the carrier is simply repositioned along the previously selected row or column to the new character therein. To be more specific if (referring to Fig. 5) the letter Q is first selected, the carrier is moved up one row and to the left two columns. If the next character selected is the letter U, the carrier remains in its upward position but shifts four columns to the right.

By providing alternately operating slides **95S** and **96S**, high speed of operation is attained since while one slide is effecting a selection the other is being restored and by providing the further latching mechanism restoration of levers required in the next selection is obviated and the extent of movement of the carrier is only that required to move directly from one character to the next without an intervening homing action. Due to the high speed so obtainable, the card can be sensed in motion

and the tape or entry receiving medium may also be in motion when the carrier is impelled against it.

While there have been shown and described and pointed out the fundamental novel features of the invention as applied to a preferred embodiment, it will be understood that various omissions and substitutions and changes in the form and details of the device illustrated and in its operation may be made by those skilled in the art without departing from the spirit of the invention. It is the intention, therefore, to be limited only as indicated by the scope of the following claims.

What is claimed is:

1. In a printing apparatus, a type carrier having a surface forming part of a sphere and having a plurality of characters arranged in a great circle on said surface, means for mounting said carrier for oscillation on its spheric center, means normally biasing the carrier in one direction, restraining means therefor, a device for releasing said restraining means to enable the biasing means to rock the carrier in said one direction a fixed predetermined extent, a further device for rocking the carrier in the opposite direction against its biasing means a fixed extent less than said predetermined extent, and means for selectively rendering either or both of said devices effective, whereby the carrier will rock through a distance equal in extent and direction to either of said extents or to the resultant of the devices operated, respectively.

2. In a printing apparatus, a type carrier having a surface forming part of a sphere and having a plurality of characters arranged in a great circle on said surface, means for mounting said carrier for oscillation on its spheric center, means normally biasing the carrier in one direction, restraining means therefor, a device for releasing said restraining means to enable the biasing means to rock the carrier in said one direction a predetermined extent, a second device for rocking the carrier in the opposite direction against its biasing means one-half of said predetermined extent, a third device for rocking the carrier in the opposite direction against its biasing means one-quarter of said predetermined extent, and means for selectively rendering all or any lesser number of said devices effective, whereby the carrier will rock through an extent equal in extent and direction to the resultant of the devices operated.

3. In a printing apparatus, a type carrier having a surface forming part of a sphere and having a plurality of characters spaced thereon, means for mounting said carrier for oscillation on its spheric center, a printing platen, said surface being normally positioned with its center opposite the platen, means for rocking the carrier in one direction, a second means for rocking the carrier in a transverse direction, control mechanism for rendering both said rocking means jointly effective to bring a selected character into printing position, latching devices for each rocking means, and means for rendering either of said latching devices effective to latch the related rocking means to thereby hold the carrier in rocked position for the related direction.

4. In a cyclically operable printing apparatus, means for sensing a record for character designations arranged in columns, said means sensing a column for each cycle of operation, a type carrier having a surface forming part of a sphere and having a plurality of characters spaced thereon, means for mounting said carrier for oscillation on its spheric center, a printing platen, an impression effecting device, selecting devices controlled by the sensing means for selecting a character for printing, means controlled by the selecting devices for rocking the carrier to present the selected character to the platen, and cyclically operable control mechanism comprising dual actuating members operative in alternate cycles to alternately rock the carrier and for causing said sensing, selecting, rocking and impression effecting means to operate in the order named for each cycle of operation, and in which the order of operations is such that operation of the impression effecting means in response to the sensing of one column is concurrent with the sensing of the designations in the next column.

5. In a printing apparatus, a type carrier having a surface forming part of a sphere and having a plurality of type elements spaced thereon, movable to pass through a printing position, and means for moving said carrier to present a selected element to the printing position, comprising a wire connected to the carrier at one end, a plurality of pulleys, an anchor, said wire extending from the carrier and looped partly around each pulley to said anchor, and means for selectively varying the positions of said pulleys toward or away from one another to thereby move the carrier an amount corresponding to the extent of movement of the pulleys and spring means acting on the carrier to keep the wire taut.

6. In a printing apparatus, a type carrier having a surface forming part of a sphere and having a plurality of type elements spaced thereon, movable to pass through a printing position, and means for moving said carrier to present a selected element to the printing position, comprising a wire connected to the carrier at one end, a pulley located to normally maintain a bend in the wire, an anchor, said wire extending from the carrier and partly around said pulley to said anchor, and means for moving the pulley away from the wire a predetermined extent to create a slack in the wire, and a spring on the carrier to take up the slack so produced to thereby move the carrier to present a selected element to said printing position.

7. In a printing apparatus, [a type carrier] *a part having a normal position and movable to a second position, means for biasing said part to its normal position,* [positioning mechanism for said carrier, including] a pair of driven elements *mounted on said part so as to have one-way driving connections therewith,* [both arranged to position the carrier,] a pair of cyclically operable actuators, one for each driven element, operable in alternate cycles, so that as one advances, the other restores, *selectively actuable* means for [engaging] *disposing* both said elements *for engagement* with their actuators during a given cycle, whereby the actuator advancing in such cycle will drive the related driven element to [position] *move* the [carrier] *part from the normal to the second position,* spring means for causing the advanced driven element to return with its actuator during the next cycle, and means effective to prevent [said] *the* return *of said part with the advanced driven element* if said elements are [engaged] *disposed for engagement* with the actuators during the said next cycle [, whereby the carrier will be retained in the position to which it was moved].

8. In a printing apparatus, a type carrier, mounted for movement through a plurality of equally spaced positions, an anchor, a wire connected between said carrier and anchor to normally hold the carrier in a home position, said carrier being spring biased against the wire to hold it taut, guides normally positioned to hold said wire in a path of predetermined configuration, and means for selectively changing the positions of said guides and anchor to alter the path of the wire and thereby move the carrier to a selected one of its other positions.

9. The invention set forth in claim 8 in which one of the guides is positionable to move the carrier a distance of one space, another guide is positionable to move the carrier through four spaces, and the anchor is positionable to move the carrier through two spaces, said selective means being effective to change the positions of one or all guides and anchor to effect a cumulative movement of the carrier.

10. In a printing apparatus, a type carrier having a plurality of columns and rows of type elements thereon, a first operating wire connected to said carrier, means for drawing said wire to move the carrier for presentation of an element in a predetermined row, a second operating wire connected to said carrier, means for drawing said second wire to move the carrier for presentation of an

element in a predetermined column, and means for rendering both said drawing means concurrently effective to present the element related to said predetermined column and row, said drawing means comprising an anchor to which the wire is connected, a pulley bearing against the wire at a point intermediate the carrier and anchor, and power operated means for causing the pulley to move against the wire a predetermined extent.

11. In a printing apparatus, an element positionable according to the character to be printed, means for mounting said element for movement, means for moving the element in one direction, a second means for moving the element in a second direction, control mechanisms for rendering the respective moving means individually or jointly effective to position said element, latching devices for each of said means, and means operable by the respective control mechanisms for rendering the corresponding latching devices effective to hold the related moving means if the element is already in the moved position for the related direction.

12. In a mechanism, a reciprocable actuator, an element to be moved from a normal to a second position, means for drivenly connecting the element to the actuator during one range of the latter's movement for movement from the normal to the second position, means normally operative to return said element to the normal position during another range of the actuator's movement, a fixed part, and other means operative to connect the element to the fixed part when the former is in the second position to prevent a return thereof to the normal position when the actuator returns.

13. In a mechanism, a reciprocable actuator, an element having a normal position and movable to a second position, means for biasing said element to the normal position, first means operable to connect the element to said actuator during one range of the latter's movement for movement from the normal to the second position, selectively actuable means for operating the first means, a fixed part, and other means operable by said selectively actuable means to connect the element when it is in its second position to said part to prevent the return of the element when the actuator restores.

14. In a mechanism, a pair of actuators reversely reciprocable between home and advanced positions, a member movable from a normal position to which it is biased to a second position, first means operable to drivenly connect the member when in home position to the actuator being moved from home position for movement to the second position, a fixed part, and other means operative to connect the member to the fixed part if the first means is operated while the other actuator is being moved from home position and the member is already in the second position.

15. In a mechanism for displacing an object different amounts, a pair of actuators reversely reciprocable between home and advanced positions, a plurality of members each of which is movable from a normal position to which it is biased to a second position, first means operatively connecting said members with said object to impart corresponding increments of displacement thereto when they are moved from the normal to the second positions, second means for the respective members operable to connect them to the actuator being moved from home position for movement to the second position, a fixed part for each of said members, third means for each of the respective members operable to connect the member to the corresponding fixed part when the member is in the second position, and selectively actuable means for the respective members effective to operate the corresponding second and third means.

16. In a cyclically operated print mechanism wherein successive characters are designated in respective cycles by combinations of one or more different signals of a set, an impression determining element positionable according to the character to be printed, a pair of actuators reversely reciprocable between home and advanced positions in every two cycles, members for each of the possible different signals of a set and each movable from a normal position to which it is biased to a second position, first means operatively connecting said members with said impression determining element to impart corresponding increments of displacement thereto when they are moved from the normal to the second positions, second means for the respective members operable to connect them to the actuator being moved from home position in that cycle for movement to the second position, a fixed part for each of said members, third means for each of the respective elements operable to connect the member to the corresponding fixed part when the member is in the second position, and other means for each of the possible different signals of a set actuable thereby to operate the second and third means for the corresponding members.

17. In a device for disposing a member biased to a normal position in a second position, a cyclically reciprocable actuator, a first pawl pivotally mounted on said member and biased to a normal position out of the path of said actuator, a fixed part, a second pawl pivoted on said element and biased to a normal position in which its path is not interrupted by said fixed part, and means operable to move the first pawl into the path of said actuator if the member is in the normal position to cause the actuator to move the member to the second position to position the second pawl so that the fixed part lies in its return path if the member is already in the second position to prevent the member from restoring when the actuator restores.

18. In a device for disposing a member biased to a normal position in a second position, a first and a second actuator reversely reciprocable between home and advanced positions, a first and a second pawl slidably and pivotally mounted on said member and biased to normal positions out of the path of the respective actuators, a third pawl pivoted on said member and displaceable therewith, a fixed part so located as to enable the third pawl to be moved therebehind when the member is in the second position, and means operable to move the first and second pawls for the driven engagement of one with the corresponding one of the actuators being moved from home position to move the member to the second position if it is in the normal position and to move the third pawl behind the fixed part if the member is already in the second position to prevent its return towards the normal position when the actuator in the advanced position restores toward home position.

19. In a device for disposing a member biased to a normal position in a second position, a first and a second actuator reversely reciprocable between home and advanced positions, a stop, a first and a second pawl slidably and pivotally mounted on said member and biased to normal positions out of the path of the respective actuators and in engagement with said stop, a third pawl pivoted on said member and displaceable therewith, a fixed part so located as to enable the third pawl to be moved therebehind when the member is in the second position, and means operable to move the first and second pawls for the driven engagement of one with the corresponding one of the actuators being moved from home position to move the member to the second position if it is in the normal position and to move the third pawl behind the fixed part if the member is already in the second position to prevent its return towards the normal position with the return of the driven pawl toward the stop when the actuator in the advanced position restores toward home position.

20. In a device for disposing a member biased to a normal position in a second position, a first and a second actuator reversely reciprocable between home and advanced positions, a stop, a guide, a first and a second

pawl slidably and pivotally mounted on said member and biased to normal positions in engagement with said stop and said guide and out of the path of the respective actuators, a third pawl pivoted on said member and displaceable therewith and biased to a normal relationship in engagement with said guide, a fixed part so located as to enable the third pawl to be moved therebehind when the member is in the second position, and means operable to move the first and second pawls from the guide for the driven engagement of one with the corresponding one of the actuators being moved from home position to move the member to the second position if it is in the normal position and to move the third pawl from engagement with the guide and behind the fixed part if the member is already in the second position to prevent its return towards the normal position with the return of the driven pawl towards the stop when the actuator in the advanced position restores toward home position.

21. In a device for disposing a member biased to a normal position in a second position, a first and a second actuator reversely reciprocable between home and advanced positions, a stop, a guide, a first and a second pawl slidably and pivotally mounted on said member and biased to normal positions in engagement with said stop and said guide and out of the path of the respective actuators, the normal position of said member being determined by engagement with said pawls in engagement with said stop, a third pawl pivoted on said member and displaceable therewith and biased to a normal relationship in engagement with said guide, a fixed part so located as to enable the third pawl to be moved therebehind when the member is in the second position, and means operable to move the first and second pawls from the guide for the driven engagement of one with the corresponding one of the actuators being moved from home position to move the member to the second position if it is in the normal position and to move the third pawl from engagement with the guide and behind the fixed part if the member

is already in the second position to prevent its return towards the normal position with the return of the driven pawl towards the stop when the actuator in the advanced position restores toward home position.

22. In an apparatus, a part movable from a normal to a second position, means for biasing said part to its normal position, cyclically operated means for moving said part from the normal to the second position and thereafter allowing it to restore, optionally actuable means for drivingly connecting the cyclically operable means to the part to enable it to move the part from the normal to the second position, and latch means operable by the optionally actuable means if the latter is actuated again before the part has moved from the second position to hold the part in the second position for the ensuing cycle.

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