Feb. 22, 1966 R. A. SCHACHT 3,236,352

KEYBOARD OPERATED AUTOMATIC MARKING MACHINE

Filed Sept. 17, 1962 8 Sheets-Sheet 1

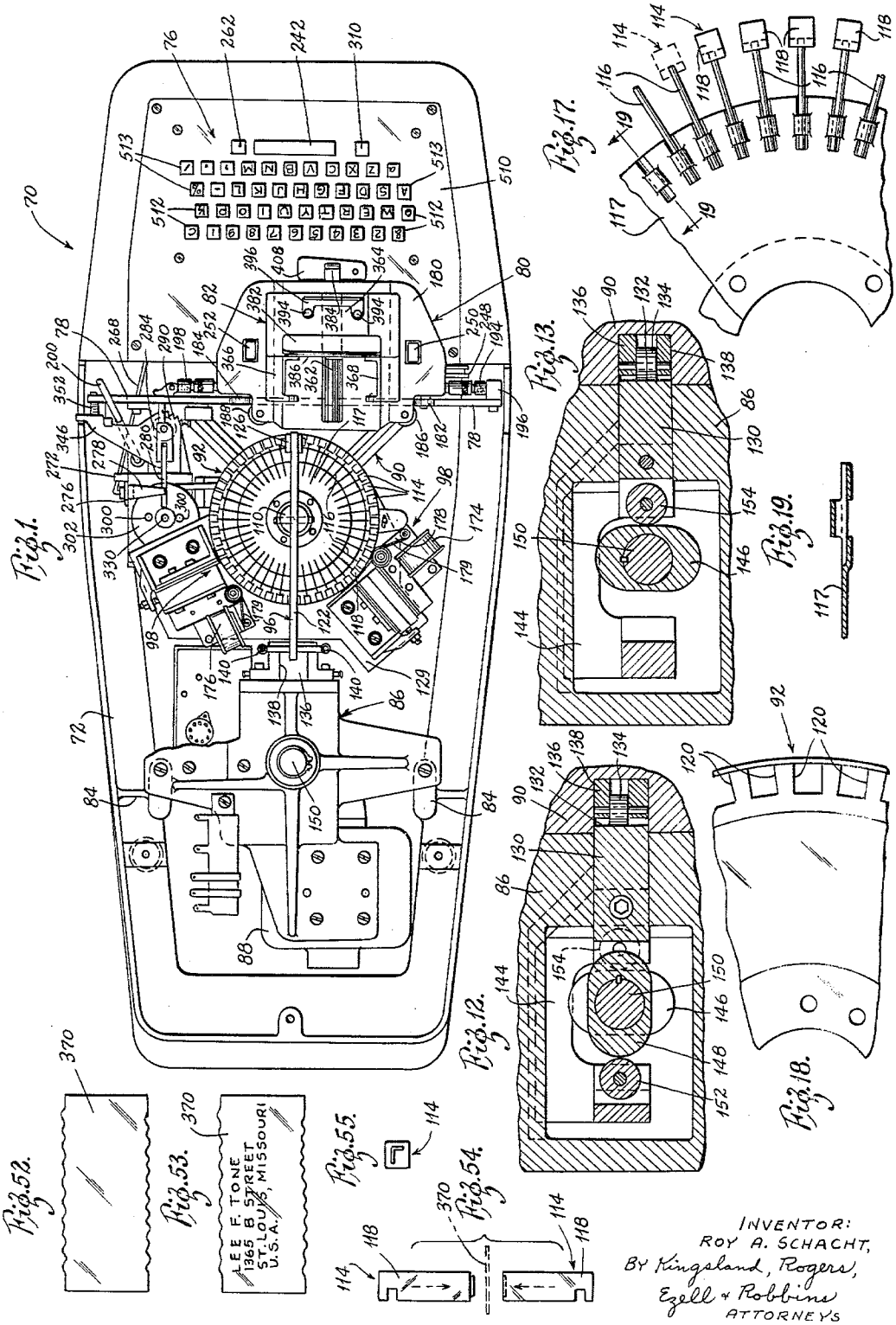


Fig. 1.

Fig. 17.

Fig. 13.

Fig. 19.

Fig. 12.

Fig. 18.

Fig. 52.

Fig. 53.

Fig. 55.

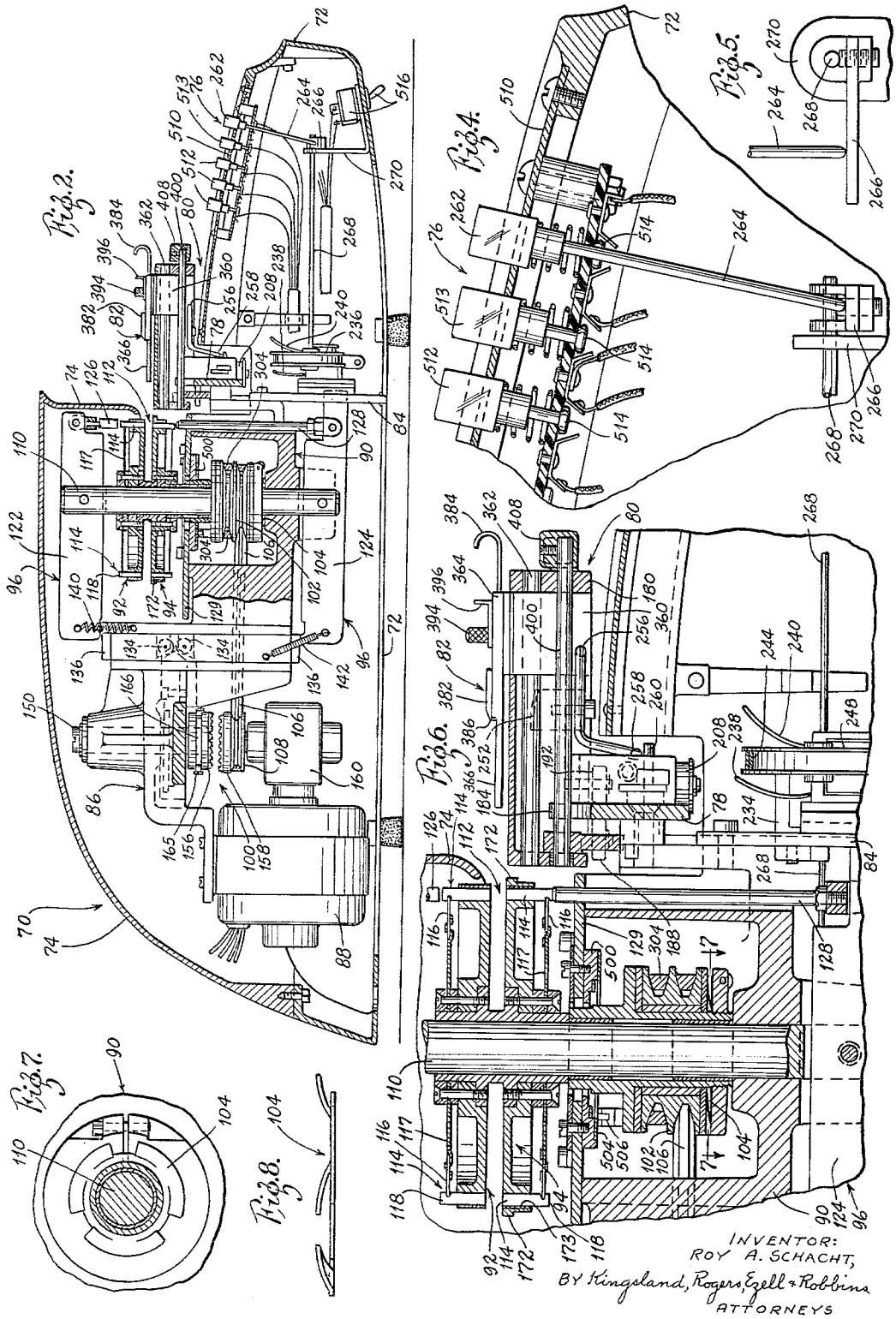
Fig. 54.

INVENTOR:
ROY A. SCHACHT,
BY Kingsland, Rogers,
Ezell & Robbins
ATTORNEYS

Feb. 22, 1966 R. A. SCHACHT 3,236,352

KEYBOARD OPERATED AUTOMATIC MARKING MACHINE

Filed Sept. 17, 1962 8 Sheets-Sheet 2



INVENTOR:
ROY A. SCHACHT,
BY Kingsland, Rogers, Ezell & Robbins
ATTORNEYS

Feb. 22, 1966 R. A. SCHACHT 3,236,352

KEYBOARD OPERATED AUTOMATIC MARKING MACHINE

Filed Sept. 17, 1962 8 Sheets-Sheet 3

Fig. 3.

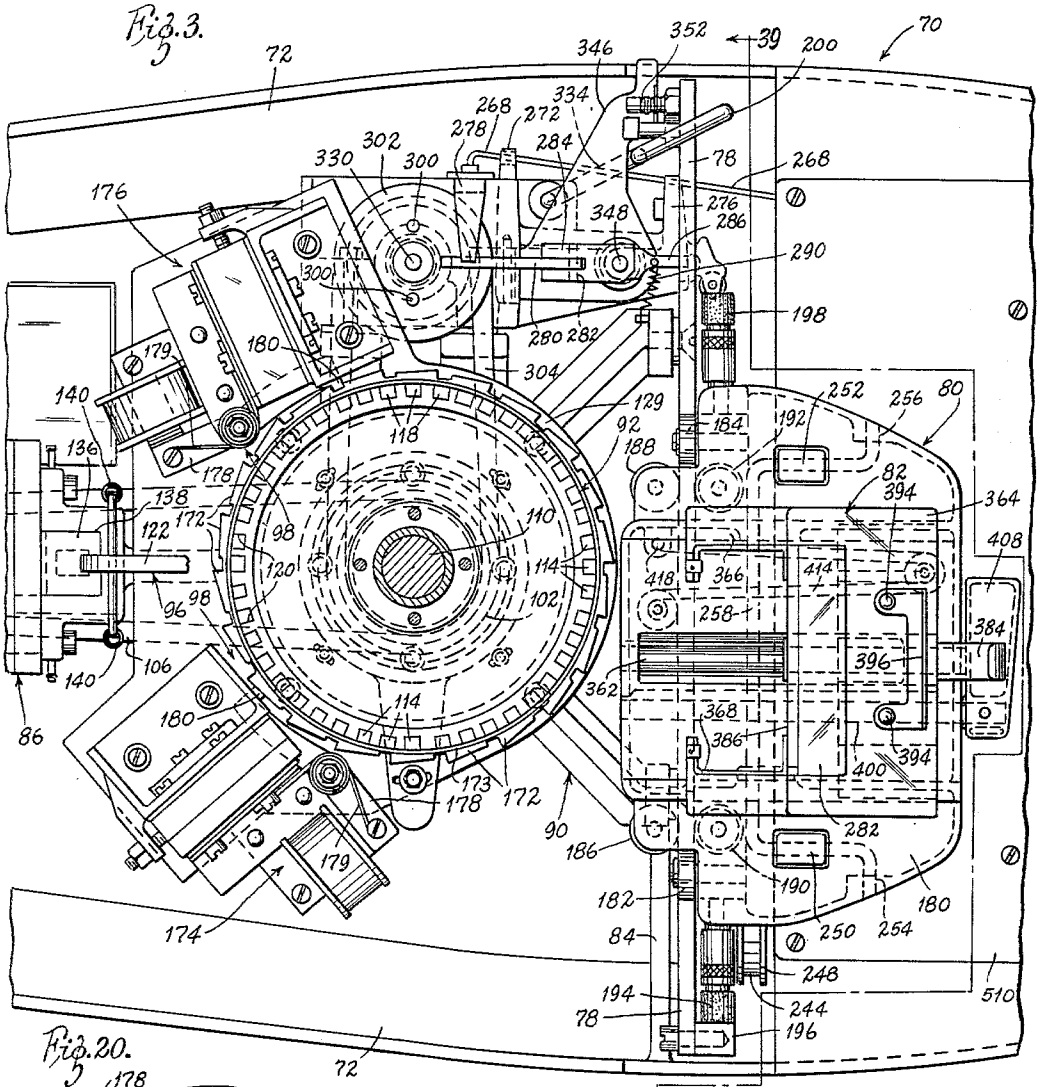


Fig. 20.

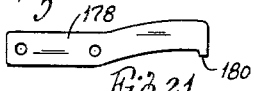


Fig. 21.

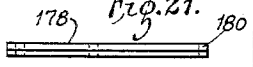


Fig. 22.

Fig. 23.

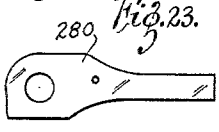


Fig. 24.

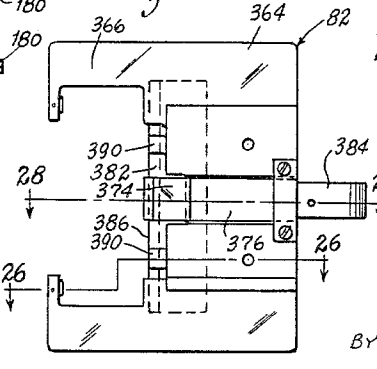
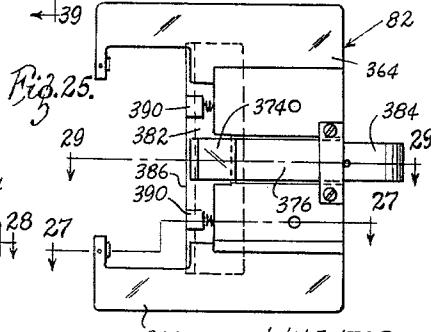


Fig. 25.



INVENTOR:
ROY A. SCHACHT,
BY Kingsland, Rogers, Ezell & Robbins
ATTORNEYS

Feb. 22, 1966 R. A. SCHACHT 3,236,352

KEYBOARD OPERATED AUTOMATIC MARKING MACHINE

Filed Sept. 17, 1962 8 Sheets-Sheet 4

Fig. 9.

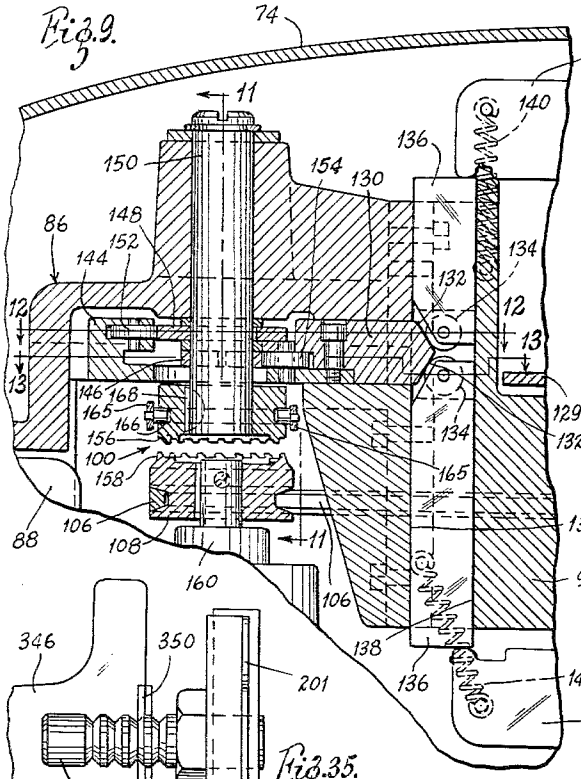


Fig. 10.

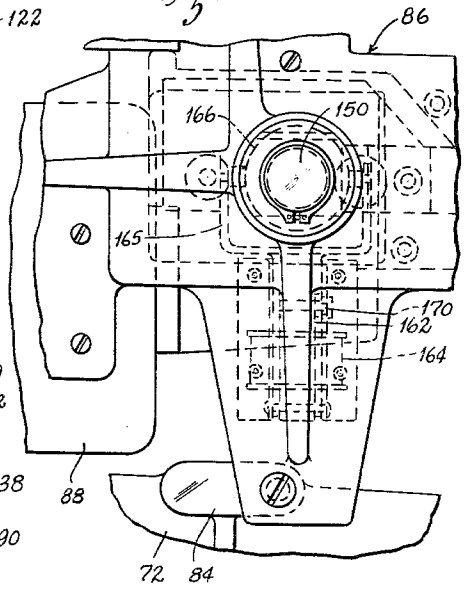


Fig. 35.

Fig. 33.

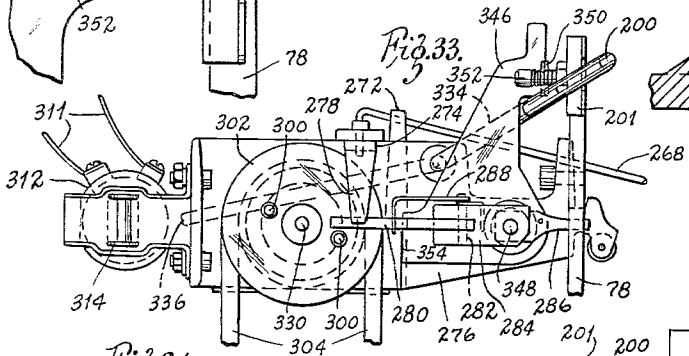


Fig. 11.

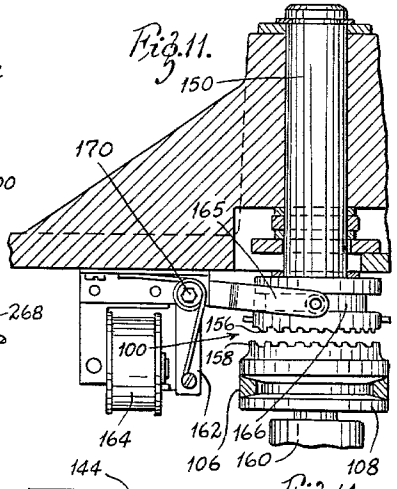


Fig. 34.

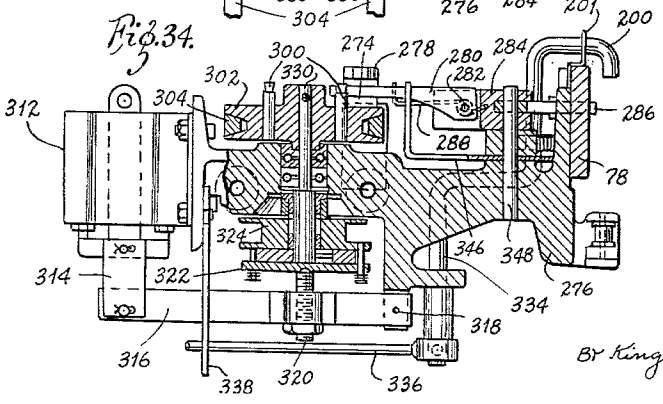


Fig. 14.

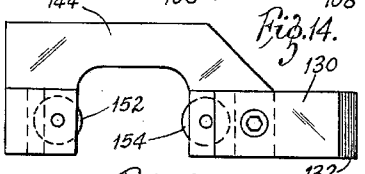
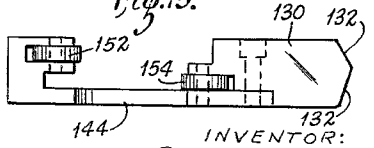


Fig. 15.



INVENTOR:
ROY A. SCHACHT,
By Kingsland, Rogers, Ezell & Robbins
ATTORNEYS

Feb. 22, 1966 R. A. SCHACHT 3,236,352

KEYBOARD OPERATED AUTOMATIC MARKING MACHINE

Filed Sept. 17, 1962 8 Sheets-Sheet 5

Fig. 40.

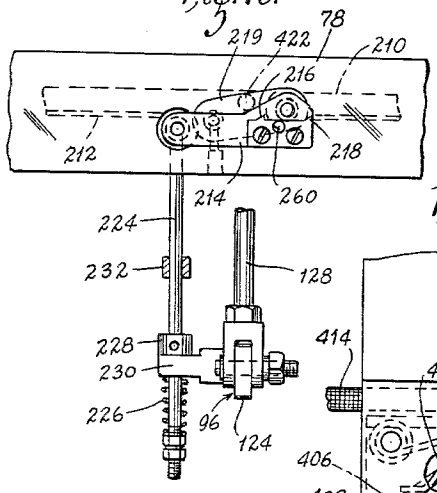


Fig. 41.

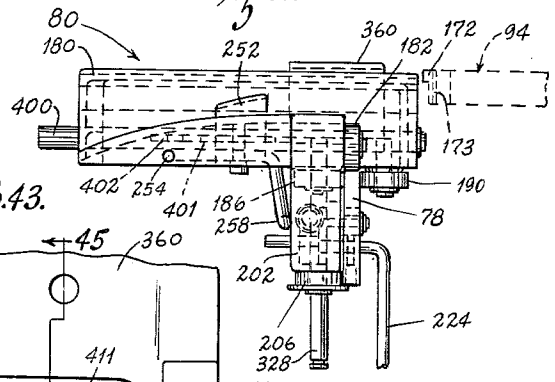


Fig. 43.

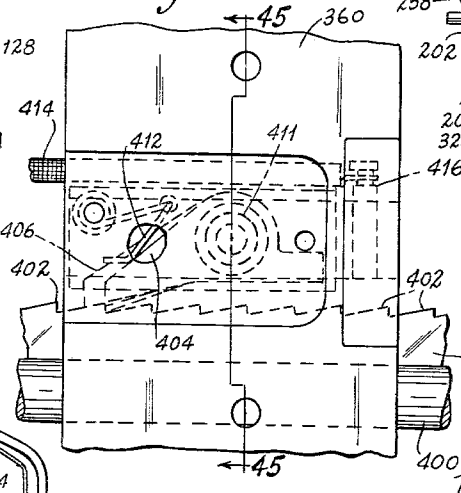


Fig. 16.

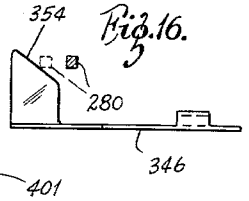


Fig. 42.

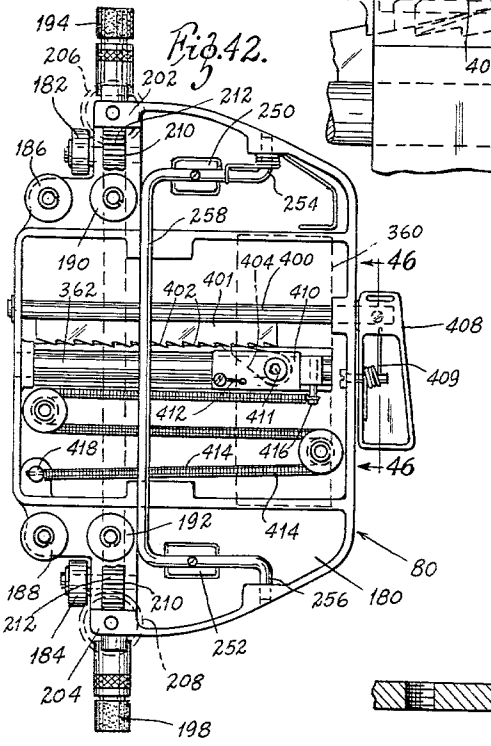


Fig. 44.

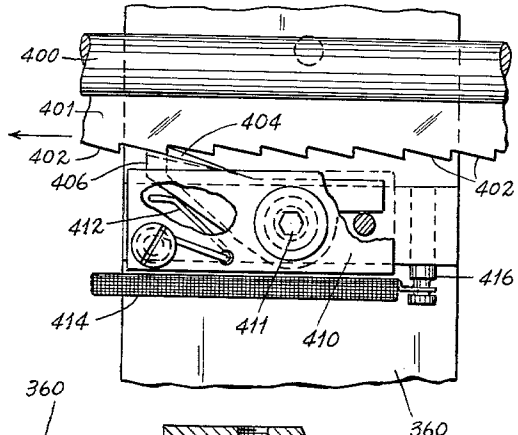


Fig. 46.

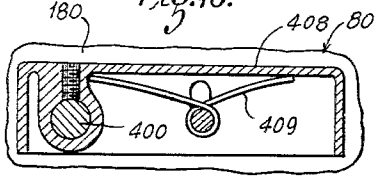
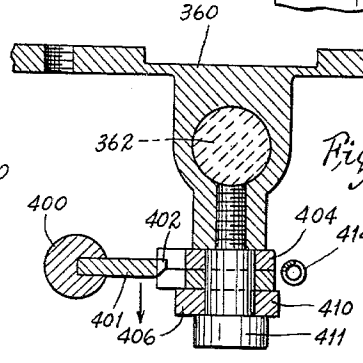


Fig. 45.



INVENTOR:
ROY A. SCHACHT,
BY Kingsland, Rogers, Ezell + Robbins
ATTORNEYS

Feb. 22, 1966 R. A. SCHACHT 3,236,352

KEYBOARD OPERATED AUTOMATIC MARKING MACHINE

Filed Sept. 17, 1962 8 Sheets-Sheet 6

Fig. 36.

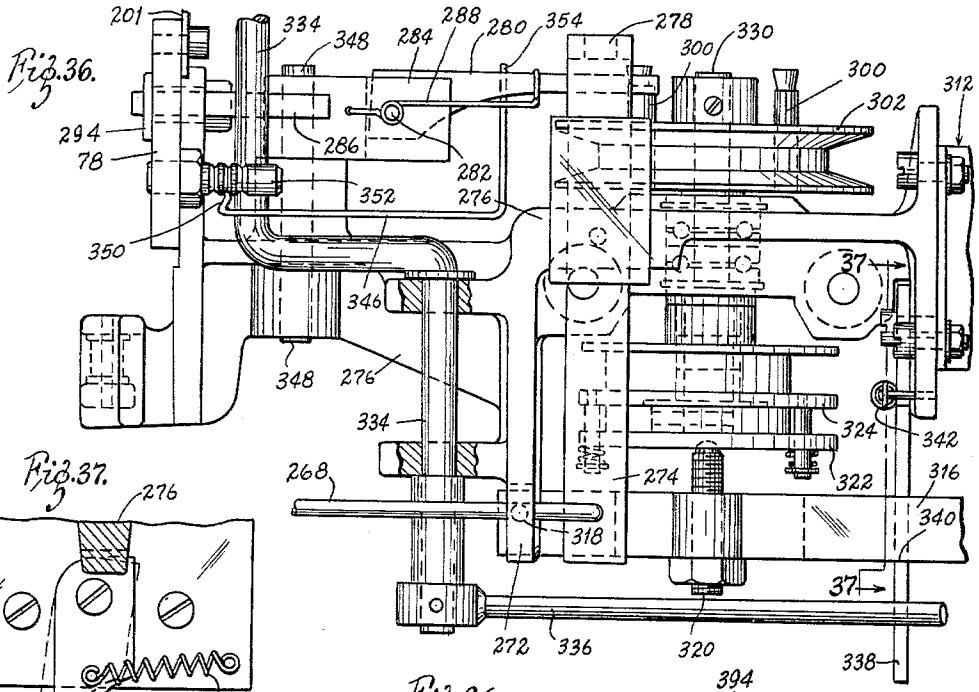


Fig. 37.

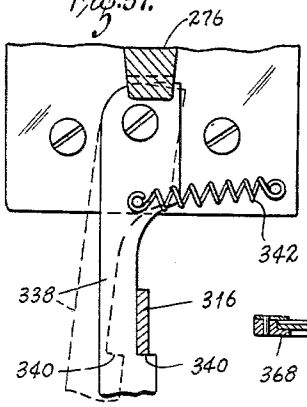


Fig. 26.

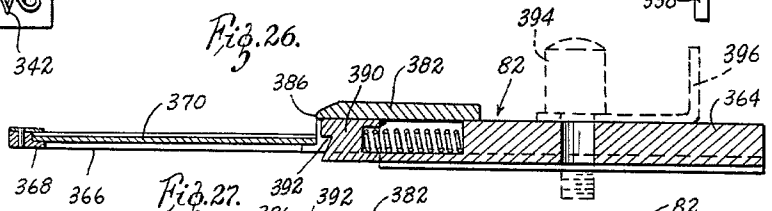


Fig. 27.

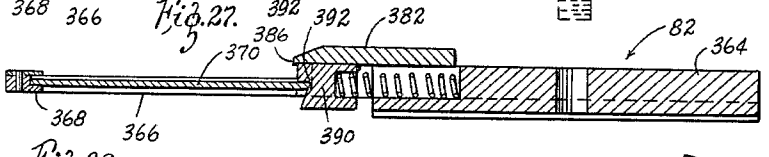


Fig. 28.

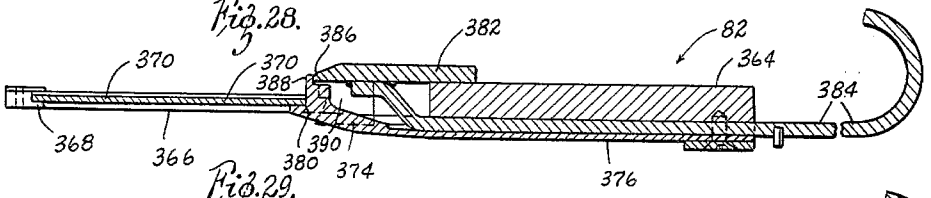


Fig. 29.

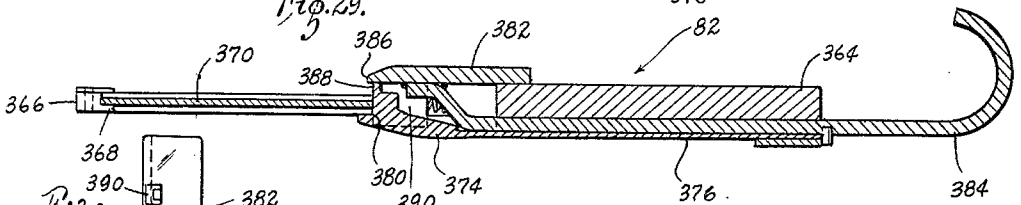
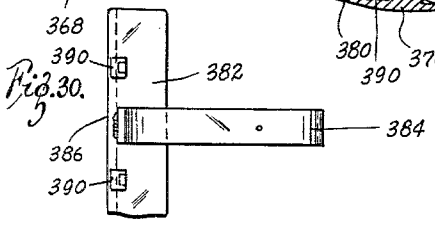


Fig. 30.



INVENTOR:
ROY A. SCHACHT,
BY Kingsland, Rogers, Ezell + Robbins
ATTORNEYS

Feb. 22, 1966 R. A. SCHACHT 3,236,352

KEYBOARD OPERATED AUTOMATIC MARKING MACHINE

Filed Sept. 17, 1962 8 Sheets-Sheet 7

Fig. 38.

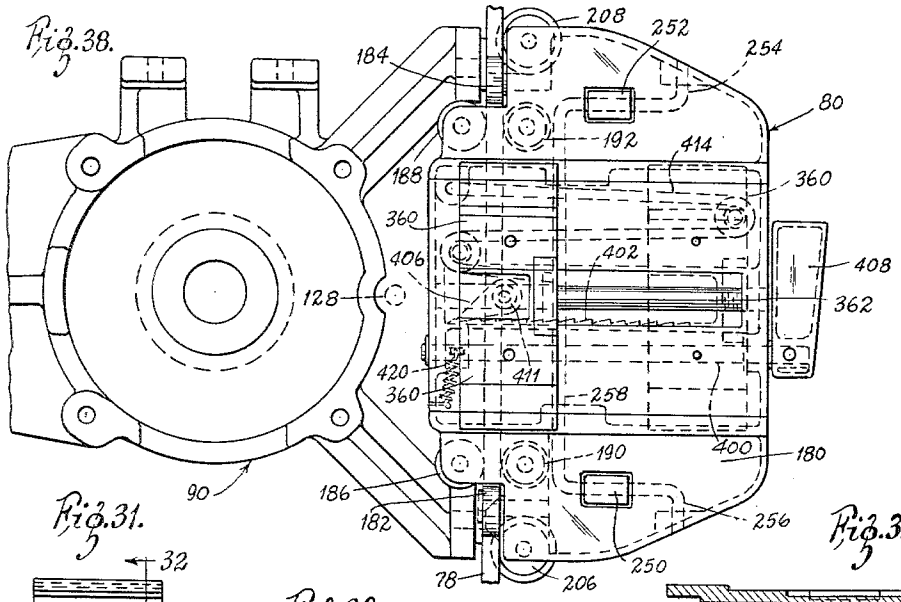


Fig. 31.

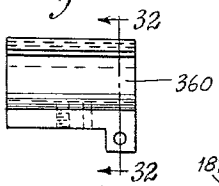


Fig. 32.

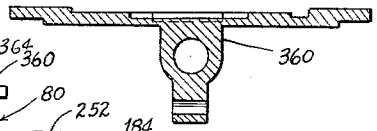


Fig. 39.

Fig. 47.

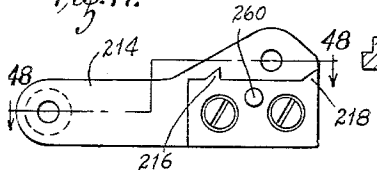


Fig. 49.

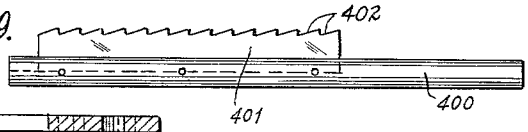
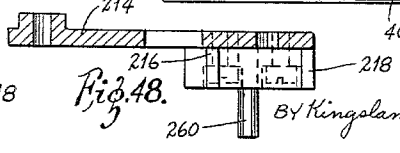


Fig. 48.



INVENTOR:
ROY A. SCHACHT,
BY Kingsland, Rogers, Ezell + Robbins
ATTORNEYS

Feb. 22, 1966 R. A. SCHACHT 3,236,352

KEYBOARD OPERATED AUTOMATIC MARKING MACHINE

Filed Sept. 17, 1962 8 Sheets-Sheet 8

Fig. 50.

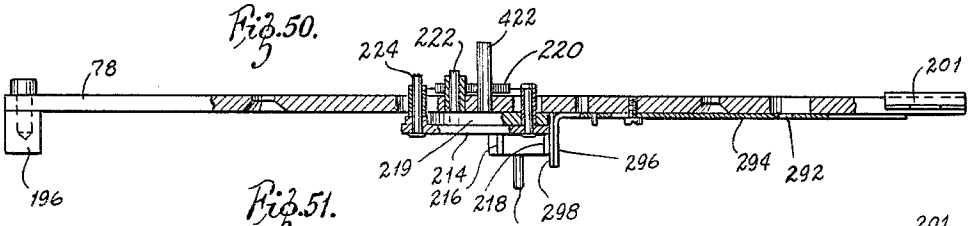


Fig. 51.

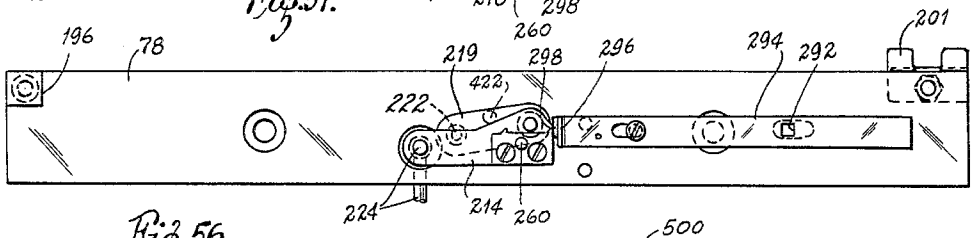
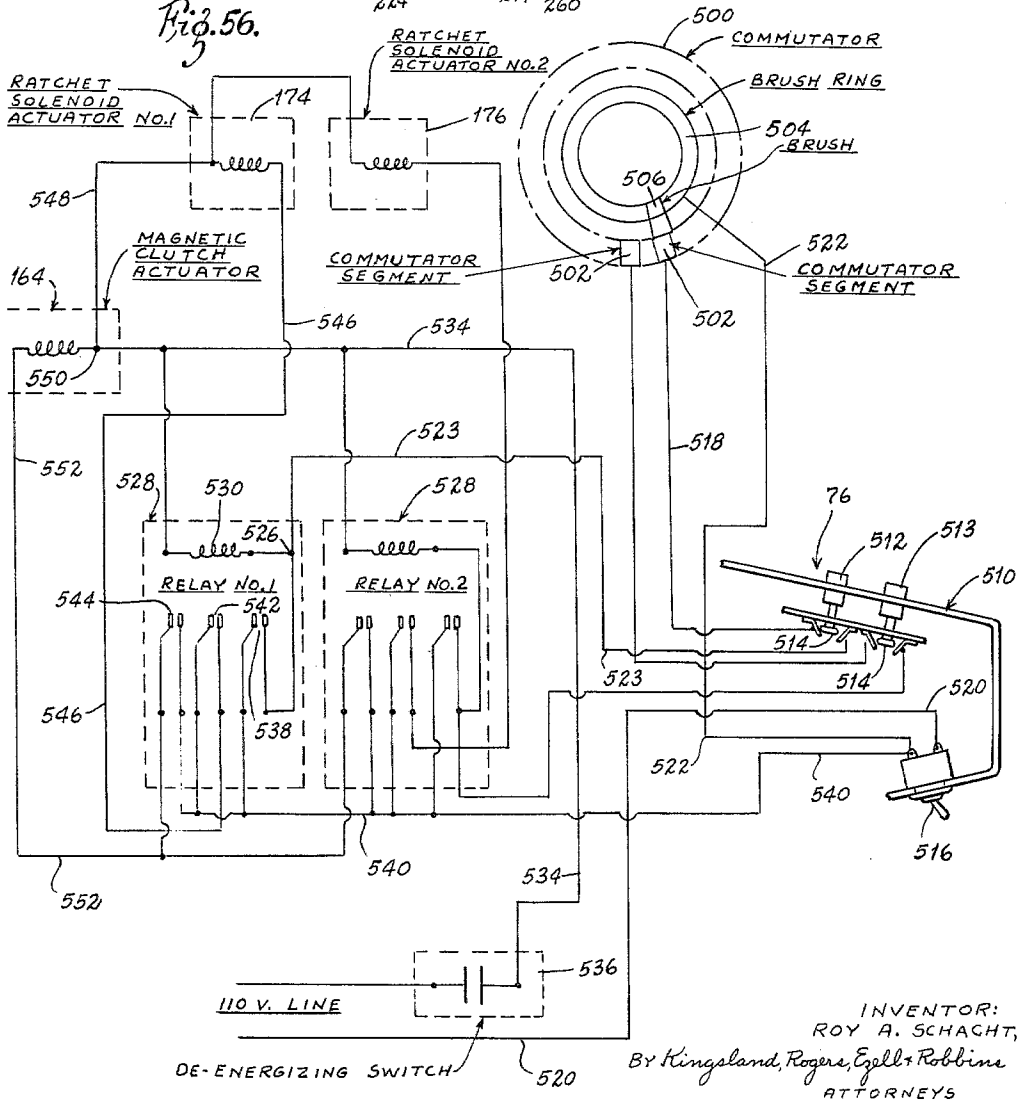


Fig. 56.



INVENTOR:
ROY A. SCHACHT,
BY Kingsland, Rogers, Ezell & Robbins
ATTORNEYS

United States Patent Office 3,236,352 Patented Feb. 22, 1966

3,236,352

KEYBOARD OPERATED AUTOMATIC MARKING MACHINE

Roy Arthur Schacht, 744 Des Peres Road, Kirkwood, Mo.

Filed Sept. 17, 1962, Ser. No. 224,605
7 Claims. (Cl. 197—6.6)

This invention relates to improvements in automatic marking machines and in particular is concerned with a marking machine that has the characteristics of a typewriter that can write on sheet metal and like surfaces.

By means of this invention there has been provided an automatic marking machine having the characteristics of a typewriter with a standard keyboard, carriage rail, and carriage frame with a workpiece or tag holder which can be moved vertically with respect to the frame in the manner of the typing of a standard letter upon a typewriter. The machine is quite rugged, which is required for such marking machines, as they must mark upon sheet metal which requires a high degree of force in the typing operation.

It is a feature of this invention that a character wheel is employed having punch and die elements upon its periphery which correspond to the individual letter characters that are to be type. The punch and die elements are located upon an integral upper and lower wheel with the tag adapted to be inserted therebetween. The wheel serves actually as a holder or guide and a separate operating mechanism is employed to move the punch and die character elements vertically through the wheels and into typing or marking contact with the tag. Control means are provided to stop the wheel in a selected position when a particular typewriter key is punched, and, through the structure of the machine, a high speed and operation efficiency have been provided.

The automatic marking machine has all of the characteristics of a typewriter, including a backspacing mechanism, a spacebar mechanism, a carriage return, and vertical feed adjustment for advancing the tag line by line into the typing mechanism. It is a significant advantage in the machine that the tag being typed upon is handled in much the same fashion as in a standard typewriter in that it is always kept at the same level in the machine, but may be moved horizontally, that is to say transversely across the machine and vertically, that is to say from the front to the rear of the machine in a horizontal plane during the entire typing operation. It will be understood that various flat objects having a substantial thickness may be typed whether they be sheet metal, plastic, or the like, and, as a result of the typing, these characters formed by the punch and die character elements are formed upon the tag, either of an embossed or debossed characteristic, so that a wide range of adaptability is provided. The characters may also be made so indent upon a tag by making one of the character heads in the form of a die while the opposite character element has a flat head or the characters may be formed to stencil by cutting out a character from the tag. These embodiments are forms of marking that may be employed just as other marking forms may be used, as will be well understood in the art.

The machine is quite rugged in its construction and yet is relatively simple in its design and can be operated by relatively unskilled workmen, which is of decided advantage in this field.

The above features are objects of this invention and further objects will appear in the detailed description which follows and will be otherwise apparent to those skilled in the art.

For the purpose of illustration of this invention, there

is shown in the accompanying drawings a preferred embodiment thereof. It is to be understood, however, that these drawings are for the purpose of illustration only and that the invention is not limited thereto.

In the drawings:

FIGURE 1 is a top plan view of the machine with the cover removed;

FIGURE 2 is a view in vertical cross section and partially in elevation taken substantially through the longitudinal axis of the machine;

FIGURE 3 is an enlarged fragmentary plan view of the middle portion of the machine showing the character wheel and the carriage casting;

FIGURE 4 is a nenlarged vertical sectional view showing the keyboard elements and mounting;

FIGURE 5 is a view in front elevation of the back spacer linkage shown in FIGURE 4;

FIGURE 6 is a fragmentary view in vertical section taken along the longitudinal axis of the machine showing the character wheel structure and the carriage casting mounting;

FIGURE 7 is a view in section taken on line 7—7 of FIGURE 6 showing the friction spring clutch;

FIGURE 8 is an enlarged view in elevation of the friction spring clutch;

FIGURE 9 is an enlarged view in vertical section taken at the rear of the machine and showing the magnetic clutch and housing in disengaged position;

FIGURE 10 is a top plan view with the cover removed of the clutch and cam housing shown in FIGURE 9;

FIGURE 11 is a view in section taken on line 11—11 of FIGURE 9;

FIGURE 12 is a view in section taken on line 12—12 of FIGURE 9;

FIGURE 13 is a view in section taken on line 13—13 of FIGURE 9;

FIGURE 14 is a detailed plan view of the cam yoke and plunger;

FIGURE 15 is a view in side eleveation of the cam yoke and plunger;

FIGURE 16 is a view in front elevation of the back space adjustment plate;

FIGURE 17 is an enlarged fragmentary plan view of the top character wheel;

FIGURE 18 is an enlarged fragmentary plan view of the character wheel similar to FIGURE 17 with the character elements removed;

FIGURE 19 is a view in section taken on line 19—19 of FIGURE 17;

FIGURE 20 is a top plan view of a ratchet element used with the character wheel;

FIGURE 21 is a view in side elevation of the ratchet element;

FIGURE 22 is a plan view of a ratchet spring with the full bodied lines indicating the natural position and the dotted lines indicating the position when installed in the machine;

FIGURE 23 is a detailed view of a backup trigger used with the backspacing mechanism;

FIGURE 24 is a bottom plan view of the tag holder removed from the carriage frame;

FIGURE 25 is a view similar to FIGURE 24 but showing the tag retaining mechanism operated;

FIGURE 26 is a view in section taken on line 26—26 of FIGURE 24 substantially enlarged and showing a tag in unlocked position;

FIGURE 27 is an enlarged view in section taken on line 27—27 of FIGURE 25 showing the tag locked in position;

FIGURE 28 is an enlarged view in section taken on line 28—28 of FIGURE 24;

FIGURE 29 is an enlarged view in section taken on line 29—29 of FIGURE 25;

FIGURE 30 is a fragmentary bottom plan view on a reduced scale of the retainer plate structure shown in FIGURES 26 through 29;

FIGURE 31 is a view in side elevation of the retainer support for the tag holder;

FIGURE 32 is a view in section taken on line 32—32 of FIGURE 31;

FIGURE 33 is a fragmentary view in elevation showing the carriage return mechanism and linkage;

FIGURE 34 is a view in longitudinal section and partly in elevation of the carriage return mechanism;

FIGURE 35 is an enlarged fragmentary top plan view of the upper right hand portion of the carriage return mechanism shown in FIGURE 33;

FIGURE 36 is an enlarged view in side elevation taken from the right side of the machine showing the carriage return mechanism;

FIGURE 37 is a view in section taken on line 37—37 of FIGURE 36;

FIGURE 38 is an enlarged top plan view showing the carriage frame with the tag holder removed and the casting support for the character wheels with the character wheels removed;

FIGURE 39 is a view in front elevation of FIGURE 38 and additionally showing the support to the frame of the machine in section;

FIGURE 40 is a fragmentary view in front elevation of the carriage return showing the operating linkage;

FIGURE 41 is a view of a portion of the carriage return mechanism and operating linkage in side elevation taken from the right side of the machine;

FIGURE 42 is a bottom plan view of the carriage frame;

FIGURE 43 is a top plan view of a portion of the carriage frame showing the ratchet mechanism;

FIGURE 44 is an enlarged bottom plan view showing the ratchet mechanism of the carriage frame;

FIGURE 45 is a view in section taken on line 45—45 of FIGURE 43;

FIGURE 46 is an enlarged view in section taken on line 46—46 of FIGURE 42 showing the carriage frame handle;

FIGURE 47 is a detail view of a feed pawl lever used with the carriage frame;

FIGURE 48 is a view in section taken on line 48—48 of FIGURE 47;

FIGURE 49 is a detail view of the tag line spacer rack;

FIGURE 50 is a top plan view partly in section showing the carriage rail;

FIGURE 51 is a view in front elevation of the carriage rail;

FIGURE 52 is a view of a typical metal tag adapted to be used in the tag holder;

FIGURE 53 is a view of the tag of FIGURE 52 with typing from the machine upon it;

FIGURE 54 is a view showing the tag in dotted lines between type characters arranged for debossing;

FIGURE 55 is an end view of one of the type characters showing the letter "L"; and

FIGURE 56 is a schematic wiring diagram of the control system for the type character elements.

The automatic marking machine of this invention is generally identified by the reference numeral **70** as shown in FIGURES 1 and 2. For ease of description, the main components of the machine will be first described and then these components will be further discussed in detail. The machine's principal components comprise a frame **72**, a cover **74**, a keyboard **76**, a carriage rail **78**, a carriage frame **80**, and a workpiece or tag holder **82**, as the externally visible components. Within the frame are vertical frame supports **84**, which support a cam and clutch housing **86**, a motor **88**, and a character wheel support housing **90**. An upper character wheel **92** and a lower character wheel **94** integrally connected are

mounted upon the housing and adapted to be operated by an operating arm mechanism **96**, while a ratchet mechanism **98** is adapted to stop the rotation of the wheels at a preselected character position through the action of a magnetic clutch **100** supported underneath the clutch housing.

The character wheel structure for character wheels **92** and **94** is best shown in FIGURE 6. As there shown, these wheels are operatively connected to a double sheave pulley **102** and are kept normally rotating by means of friction clutch spring **104**. Pulley belt **106** connects the pulley block with the lower pulley half **108** of the magnetic clutch, which is kept constantly rotating through the action of the motor. Thus, the frictional engagement of the constantly rotating pulley block **102**, thrust upwardly through the friction clutch spring **104**, serves to rotate the character wheels **92** and **94** in normal operation about the stationary vertical support rod **110**, until the wheel is stopped in a preselected position against the force of the friction spring in a marking operation as will be later described.

The wheels **92** and **94** are constructed as a fixed unit and rotate together. They are spaced from one another to leave a space **112** so that a workpiece or tag may be inserted therebetween. Each of the wheels has 44 character elements positioned around its periphery and the character elements are generally indicated by the reference numeral **114**. The character elements are constructed so as to operate resiliently by a resilient spring **116** attaching them to a center disk portion **117** of the wheel, while the character element head **118** is positioned on the periphery of the wheel and can move in reciprocating fashion through guide openings **120** that are formed by vertical holes. It will be understood that the character elements may be arranged for either embossing or debossing as will be readily apparent to those skilled in the art. In the embodiment shown, the top wheel is provided with character head elements which are male in character and operate as a punch, while the bottom character elements have recessed character elements and operate as a die so that a debossing arrangement is provided.

The character element heads **118** have a flat top and are adapted to be struck by an operating arm contact member so that for the upper wheel **92** the character elements are moved downwardly against the tag. In like fashion the character elements in the bottom wheel **94** are adapted to be struck upwardly so that the two character elements are moved toward one another to form a character on the tag when it is positioned between them.

The operating arm mechanism **96** is comprised of an upper operating arm **122** and a lower operating arm **124**, each of which is pivotally mounted upon the upright support **110** at the upper and lower ends respectively. This arrangement is best shown in FIGURE 2. The contacting portion or striking portion of the upper operating arm **122** comprises a striker member **126** pivotally mounted to the front end of the operating arm, and, as shown in FIGURES 1 and 6, this is positioned directly over the front character element upon the outer periphery of the wheel looking at the wheel from the front of the machine. The bottom operating arm **124** is likewise connected at its forward end to an operating or striking member **128**, which extends upwardly through the cover plate **129** of the character wheel housing which has an opening therein serving as a guide.

The mechanism for actuating the upper and lower operating arms **122** and **124** is best shown in FIGURES 2 and 9–15. As there shown, a cam rod **130** having converging cam surfaces **132** is adapted to be moved backwardly and forwardly along the axis of the machine as best shown in FIGURE 9. In so doing, it will contact rollers **134** mounted upon contact blocks **136** of which there are a pair, as shown in FIGURE 9, and which move vertically within a guide channel **138** formed at the top and bottom of the character wheel casting. When the

blocks 136 move apart from one another they move the driving ends, that is the rear ends of the upper and lower operating arms 122 and 124. The rear ends of these operating arms are biased by springs 140 and 142 to hold them against these reciprocal blocks.

The cam rod 130, as best shown in FIGURES 12 through 15, is formed as part of a cam yoke 144, which is movable back and forth within the casting 86 by a pair of cam lobes 146 and 148 connected to a clutch shaft 150. The top lobe 148 is adapted to contact a top roller 152, carried by the cam yoke, and the lower lobe 146 is adapted to contact a cam roller 154, positioned underneath the first of these rollers. By this structure the yoke is moved back and forth within a track formed within the casting 86 as shown in dotted lines in FIGURES 12 and 13.

The clutch shaft 150 is normally stationary and is adapted to be moved only when a character is typed, which action is effected when the clutch 100 is clutched by the switching mechanism operated when a typewriter key is operated, as will further be described. The clutch structure includes a top toothed clutch head 156 keyed to the clutch shaft 150, and a bottom toothed clutch head 158 which in turn is connected to the motor through a gear box 160. The lower clutch head forms part of the pulley 108, previously described, and which furnishes power to the character wheels through the pulley belt 106.

The operating mechanism for actuating the clutch head 156 and moving it into engagement with the lower clutch head 158 is best shown in FIGURES 9 and 11. As there shown, a magnetic clutch actuating arm, which is generally of L-shaped construction, is indicated by reference numeral 162. This actuating arm 162 is shown in the unoperated position in FIGURE 11 adjacent a solenoid 164 forming part of the magnetic clutch. The clutch actuating arm 162 is in turn connected by a yoke 165 to a groove 166 around the periphery of the clutch head 156. The clutch head is keyed to the clutch shaft 150 by appropriate key mechanism 168. The actuation of the solenoid 164 moves the actuating arm clockwise about its pivot point 170 to move the clutch head downwardly and into engagement with the lower clutch head 158.

The means for selecting a particular character element for typing is best shown in FIGURE 3. As there shown, for the character wheel containing forty-four elements, and it will be understood that this may be varied, there are provided twenty-two ratchet teeth 172 around the periphery of the lower character wheel. These teeth are mounted on a ring connected to the outer end of the lower wheel body 94 by a rubber cushioning rim 173 as best shown in FIGURE 6. The rubber rim acts as a sound deadener when the ratchet teeth are engaged by ratchet levers to be described below. In order to stop the character wheel at a preselected position so that the desired character element is positioned in line with the operating or striking elements of the upper and lower operating arms, two ratchet solenoids 174 and 176, as shown in FIGURE 3, are used. Each of these has a pivotable ratchet 178 which is spring biased by means of a spring 180 out of contact with the ratchet wheel. It is noted that both of these ratchet elements having a ratchet tooth 180 are positioned such that when one ratchet tooth engages a ratchet element 172 on the wheel the other is positioned one-half a ratchet element length away as shown in FIGURE 3. This provides for faster operation and in this manner only twenty-two ratchet elements are needed for the forty-four character elements. The character wheel housing 90, as shown in FIGURE 56, is provided with a commutator housing 500, and separate commutator segments 502, equal in number to the character elements on the character wheel. This housing also carries a brush ring 504 which cooperates with a brush element 506 affixed to the character wheel. The brush is adapted to maintain ring contact and also sweep the annular series of commutator segments 502 as is well understood in the art. A keyboard assembly 510 is associated with the commutator and has a plurality of key elements 512 which are associated with the character elements upon the character wheel. The keyboard plate 510 is connected to the frame of the machine as best shown in FIGURES 1 and 2. Each of the keys 512 and 513 have a spring biased switch element 514 as best shown in FIGURE 4.

In order to obtain greater speed and positive operation of the printing cycle, the keys and the commutator segments 502 are divided into two groups corresponding to the two ratchet levers or elements for ratchet solenoids 174 and 176 of FIGURE 3. This greatly assists in the operation since there is a slight time lag in the magnetic ratchet actuation response to the key operation and is preferred that the large ratchet elements 172 be employed as they have a greater arc length than would be the case if a single ratchet were employed having twice as many elements.

Actuation of the on-off switch 516 supplies current to the several circuits controlled by the keys 512 and 513, but none of these circuits is energized until a key is depressed to actuate its associated switch 514 to the closed position. The diagram of FIGURE 56 includes only one representative circuit for each of the two key groups 512 and 513, it being understood that there are many circuits, one for each key through its own segment of the commutator to the relay of its key group. In this diagram it is clear that the upper left key 512 and its switch is associated with its commutator through lead 518 and that other switches are associated with their associated relay through the proper commutator segments by individual leads.

For the circuit of the key shown, current from one side 520 of the supply line leads to the switch 516 and by lead 522 connects with the brush ring 504 so that the brush is always on one side of the circuit. Since the final completion of the circuit when the key 512 is operated is made between the brush and the commutator segment 502 associated with the key, the circuit from segment 502 is seen to include lead 518 to keyboard switch 512 and lead 523 from the switch to terminal 526 at relay 528. Relay 528 acts to hold the magnetic clutch coil 164 and the ratchet coil 174 energized for a desired time interval.

Relay coil 530 within the relay 528 is connected to lead 523 at one side and at the opposite side to the power line at lead 534. In the latter lead, a deenergizing switch 536 is inserted for a purpose later appearing. Energization of relay coil 530 closes the contacts 538 so that the lead 540 from switch 516 places the relay coil 530 across the lines 520–534 to constitute a holding circuit for the relays. At this time key 512 may be released.

Simultaneously with the closure of contacts 538, a second pair of contacts 542 and a third pair of contacts 544 are closed. Contacts 542 are connected by lead 546 to the solenoid ratchet actuator 174 and the opposite side of the actuator is connected by lead 548 to the supply line 534 at terminal 550 for the magnetic clutch actuating relay 164.

Contacts 544 act to place the magnetic clutch actuator 164 in the main circuit through the lead connection 552. It should be understood that the above-described circuits for the ratchet solenoids and the magnetic clutch solenoid are not actually completed upon depressing the key 512, but merely establish a proper circuit so that when the brush 504 rotates into contact with the commutator segment 502 associated with the depressed key, the circuit is then established. At this time the ratchet solenoid 174 actuates its ratchet lever 178 to engage the ratchet element 172 upon the character wheel to stop it at the proper position for marking of the selected character. It will be understood that one-half of the required keys are associated with the ratchet solenoid 174 and the other one-half are associated with the other ratchet solenoid

176 to evenly distribute the load, as aforementioned, and increase the speed of operation. Concurrently with the actuation of the ratchet solenoid 174 for example, the magnetic clutch relay 164 is operated and the magnetic clutch head 156 is engaged thereby with the rotating lower clutch head 158.

Rotation of the clutch shaft 150 rotates the cam lobes 146 and 148 and causes the cam yoke to move forwardly, driving the cam rod 130 towards the front of the machine. As the cam rod 130 is moved forwardly, its cam surfaces spread apart the cam blocks 136 and cause the operation of the upper and lower operating arms 122 and 124, as best shown in FIGURES 2 and 9.

Upon the operation of the operating arms, the character elements in the character wheels are contacted or struck to imprint a character upon the tag placed within the wheel. A one-half revolution of the cam shaft is required to complete the marking cycle due to the arrangement of the cam lobes 146 and 148 at right angles with respect to one another as shown in FIGURE 12, and their engagement with the cam yoke. Upon the return of the cam yoke to a starting point in this cycle, a conventional switching mechanism (not shown) is employed to open the deenergizing switch 536.

The opening of switch 536 breaks all of the holding circuits created at the relay 528 and each of the contact pairs 538, 542 and 544 are opened. At this time the magnetic clutch assembly disconnects and the lower clutch head 158 is released to reestablish its driving operation. Accordingly, magnetic clutch shaft 150 comes to rest and as the ratchet relays are released the character wheels are free to rotate again. This rotation begins anew as the lower clutch head 158 will rotate the character wheels through the pulley belt 106 between the pulleys 108 and 102, and driving engagement with the character wheel is reestablished through the friction clutch spring 104. The remaining circuit of FIGURE 56 for the typewriter key 513 is substantially identical to that previously described for key 512. For key 513 it will be understood, as shown in the drawing, that it is operatively associated with a separate commutator segment 502 associated with it individually. Key 513, as shown in the drawing, is adapted to be connected in circuit to the second ratchet solenoid 176 and also the No. 2 relay in the hold relay 528, and the electrical circuit is identical with that previously described for key 512.

It will be understood that in the diagram of FIGURE 56, and as previously brought out, that the deenergization switch 536 will function to break each of the circuits in the machine after the clutch shaft 150 has made a one-half revolution. The breaking of each one of these circuits automatically reestablishes the rotation of the character wheels until another typewriter key is depressed.

The carriage frame 80 is best shown in FIGURES 1, 3, 6, 38, 39 and 42. As there shown, it is comprised of a casting body 180 and is supported upon the carriage rail 78 by a pair of rollers 182 and 184 mounted upon a horizontal axis and situated at the rear of the frame at the left and right sides, respectively. Rear rollers 186 and 188 are also mounted upon the carriage frame on a vertical axis to engage the rear of the carriage rail. Front rollers 190 and 192 are likewise mounted upon a vertical axis and engage the front of the carriage rail so that a secure sliding engagement upon the rail is provided. A left side carriage stop member 194 is provided which is adapted to abut against a rail stop member 196. Likewise, on the right side, a frame stop member 198 is provided, which is adapted to contact a carriage return stop lever 200 positioned within a guide bracket 201.

The carriage frame is also provided with a pair of downwardly depending legs 202 and 204, as best shown in FIGURE 39. The legs support a pair of flanged wheels 206 and 208 which hug the bottom of the carriage rail. This structure completes the sliding connection of the carriage frame to the carriage rail.

In order to provide horizontal or transverse advancement of the carriage along the carriage rail from the left to the right position viewed at the front of the machine, a horizontal rack bar 210 is connected between the legs of the carriage frame. In the terminology used, it will be understood that, as in the standard typewriter, the term horizontal is meant to mean transverse movement across the machine, while later on in the description vertical movement with respect to advance of the tag or other workpiece to be typed upon will be meant to imply movement from the front to the rear as in the standard letter, and in a typewriting machine where the letter is advanced vertically from one line to the next line. All of the above movements are in a horizontal plane.

The horizontal rack is provided with tooth elements 212 at the bottom. A feed pawl lever 214, as shown in FIGURES 47 and 48 having tooth elements 216 and 218, is provided to obtain controlled movement of the carriage frame upon the horizontal rack bar. The lever is pivotally connected to a pawl link 219 which, in turn, is pivotally mounted upon the carriage rail 78 as best shown in FIGURES 50 and 51. The feed pawl lever is held in normal engagement with the rack bar with the toothed elements engaging the notches therein by means of a biasing spring 220, as shown in FIGURE 50, which fits on the back of the carriage rail and urges a stud shaft 222 fitting through an opening in the carriage rail to an upward position. The feed pawl lever is pivotally connected at its other end, as shown in FIGURE 51, to an operating arm 224. This operating rod is spring biased to a downward position by a spring 226. The operating rod is further provided with a collar 228 and is connected to the end of the lower character element operating arm 124 by an arm member 230 having an opening through which the rod 224 fits as best shown in FIGURE 40. By means of this structure, every time the character wheel operating arms are operated, when a key is typed, the feed pawl lever is operated and the carriage frame at the completion thereof is advanced one notch along the horizontal rack 210.

The feed pawl operating lever 224 also serves as a spacer bar operating mechanism. Thus, as shown in FIGURES 6 and 39, the operating rod 224 is fixed to an arm 232 of a reciprocally movable armature 234 of solenoid 236. The solenoid is connected by leads 238 and 240 to a spacer bar 242 mounted upon the keyboard of the machine as shown in FIGURE 1. This spacer bar is provided with a spring biased contact switch similar to the character keys otherwise described in this specification. Upon the operation of the spacer bar, the solenoid is operated and the armature is moved upwardly to provide the same movement to the operating arm 224, as previously described, when the operating arms of the character wheels operate. This operation likewise causes the carriage frame to move one space to the left when the feed pawl lever is disengaged.

The movement of the carriage frame when the feed pawl lever is disengaged, either upon the typing of a character or upon the operation of the spacer bar, is effected by spring action, which constantly biases the carriage frame to the left of the machine. This biasing action is effected by a tape 244, as best shown in FIGURE 39, which is connected at one end to a stud 246 upon the leg 204 of the carriage frame and is connected at its other end to a spring loaded reel 248 mounted upon a vertical support extending from the frame of the machine.

A manual means for disengaging the feed pawl lever is provided by a pair of frame disengaging buttons 250 and 252 situated upon the sides of the carriage frame as shown in FIGURE 38. As shown in FIGURE 6, these buttons are connected to a carriage frame disengaging rod pivoted at its opposite ends 254 and 256 to the sides

of the carriage frame. An engaging portion 258 of this rod is bent downwardly, as viewed in FIGURE 6, and, upon operation of the disengaging button, is adapted to contact a disengaging pin 260 extending from the side of the feed pawl lever. This engagement causes the downward movement of the feed pawl lever to disengage the teeth from the horizontal rack bar permitting the carriage frame to be moved laterally, that is to say horizontally in either direction across the machine, as desired.

The backspacing mechanism, as shown in FIGURE 4, comprises a backspacer key connected to an operating rod 264 engageable with an arm 266 of a pivotal rod 268 mounted for pivotal operation upon a support 270. The rear end is mounted for pivotal relation within a support 272 as shown in FIGURE 3 and has a hooked end fastened to a vertically movable operating member 274, which is receivable within a support bracket 276. The operating member 274 has a horizontal arm 278 at the top, as best shown in FIGURES 3 and 33, which is adapted to contact the free end of a pivot arm 280 pivoted upon a pivot shaft 282 mounted on a pivot block 284. The front end of the pivot block is provided with a back-up trigger 286. The pivot arm 280 is biased to an upward position by a biasing spring 288. The pivot block and the back-up trigger are biased to a clockwise position by a biasing spring 290. The free end of the back-up trigger extends through an opening in the carriage rail as best shown in FIGURES 1 and 51, and is adapted to engage a notch 292 in a back-up rod 294 mounted for sliding movement upon the front of the carriage rail. This back-up rod has a flanged left end as shown in FIGURE 50, indicated by reference numeral 296, and is provided with a toothed member 298 which is engageable with the notched teeth of the horizontal rack bar 210.

The operation of the back-up bar through the back-up trigger, the pivot arm, and the actuating member is effected by vertical striker pins 300 shown in FIGURE 3 and FIGURES 33 and 34, which are mounted upon pulley 302. This pulley mounted upon the supporting casting 276 is connected by pulley belt 304 to the top sheave of the double sheave pulley block 102, previously described. It will be noted, as shown in FIGURE 34, that the operating arm 278 is of substantial thickness, such that at the completion of the operating arm movement, when the striker pins have moved the pivot arm to the clockwise position as shown in FIGURE 33 to move the pivot arm downwardly as viewed in FIGURE 33 and away from the operating arm, it cannot be returned to its original position to be struck by a striking pin again, as it is blocked by the end of the operating arm and this prevents repeated backspacing. Should, however, repeated backspacing be desired, the operating arm member 278 can be extended in length, as will be readily understood. In the aforementioned operation, the biasing spring 288 keeps the pivot pin out of the path of the striking pin and in engagement with the end of the aforementioned operating arm. A cam to be described later in conjunction with the backspacing adjustment mechanism is also employed in this operation.

The carriage return mechanism, which moves the carriage frame from left to right across the machine, is best shown in FIGURES 34, 36, 37 and 39. A carriage return key 310 upon the keyboard has a spring biased switch in the same fashion as the other keyboard elements and is connected by leads 311 to solenoid 312 shown in FIGURE 34. The solenoid has a vertically reciprocal armature 314 connected to one end of a clutch arm 316. The other end of the clutch arm is pivotally connected to a support at 318. An adjustment bolt 320 is threadedly connected at the center portion of the brake arm and abuts against a friction clutch 322, as shown in FIGURE 34. The friction clutch in turn is connected to a tape reel 324. One end of a tape 326 is connected to the reel and the other end is connected to an extension leg 328 of the carriage as best shown in FIGURE 39. The armature is normally in the downward position such that the friction clutch is not engaged and the shaft 330, to which the friction clutch is mounted and which is connected to the pulley 302, does not tend to move the tape reel so that there is no tension upon the tape. When the carriage return key is operated, however, the solenoid 312 is energized and the clutch arm 316 is operated, causing the friction clutch to furnish torque from the shaft 330 to the tape reel and tension the tape 326 and move the carriage frame from left to right upon the carriage rail.

A stop mechanism 200 is provided for the carriage return device which is best shown in FIGURE 34. This is designed to keep the carriage from running too far to the right on the machine, and a contact rod 334, mounted for pivotal operation on the support casting 276, is provided. The rod 334 is adapted to be contacted by the carriage frame stop member 198 as best shown in FIGURE 3 when the carriage frame moves to the right of the machine. The lower end of the rod 334 is connected to striker arm 336, which is adapted to contact a latch arm 338. The latch arm 338 has a shoulder 340, as shown in FIGURE 37, and is spring biased by a spring 342 to engage the clutch arm 316. In this operation, when the carriage frame contacts the rod 334, the rod will pivot and the striker arm 336, which had locked the clutch arm in place upon the actuation of the carriage return key, will be disengaged.

Associated with the backspacing mechanism is a multispace backspacing lever 345 as best shown in FIGURES 33 and 36. This lever is pivoted at the same pivot point 348 as the aforementioned backspacing pivot block. It is used for multispace adjustment in backspacing and has an adjustment blade 350 which can be moved into any one of three notches upon an adjustment stud 352 mounted at the rear of the carriage rail as best shown in FIGURE 36. The lever is further provided with a cam surface 354, which slopes upwardly and is adapted to be contacted by the pivot arm 280 to limit its length of travel. The length of travel of the pivot arm determines the degree of backspacing whether it be one, two or three spaces. Since the cam surface, viewing it from the front, slopes upwardly from right to left, the pivot arm when it is moved counterclockwise by contact with the striking pins 300 upon the pulley 302 will be caused to ride upwardly out of contact with the striking pins when the cam surface is engaged. When this point in the operation is reached, the pivot arm will then be returned at the end of the operation to starting position by spring action. When the backspacing key element is released, the operating arm 278 is moved upwardly and the pivot arm again moves underneath it to be ready for a new backspacing operation.

The mechanism for holding the workpiece or tag to be typed upon is termed, for convenience, a tag holder and is generally indicated by the reference numeral 82 and is best shown in FIGURES 3, 24 through 30, 38 and 39. As there shown, it is carried upon the top of the carriage frame by support to a retainer support 360, best shown in FIGURES 31 and 32. The retainer support is mounted upon a rod extending axially along the machine and supported on the carriage frame. This rod is designated by element 362 as shown in FIGURE 39.

The tag holder, as shown in FIGURES 24 through 30, has a main body section 364 and a jaw section 366 with a shoulder 368 extending around it whereby a tag 370 may be received. The tag 370 shown in FIGURES 52 and 53 may be made of light sheet metal or any deformable material such as various types of plastic and the like. As shown in FIGURES 28 and 29, a spring biased tongue member 374 is connected to the bottom of the tag holder by a leaf spring 376. The tongue member is provided with a shoulder 380 adapted to receive the edge of the tag. A movable lock member 382, and movable to a slight degree along the axis of the machine, is also mounted in the tag holder and has a handle 384 whereby this manual movement may be effected. A forward lip ele-

ment 386 is provided on the lock member which is adapted to engage with a shoulder 388 formed on the jaw of the tongue member 374 as shown in FIGURES 28 and 29. The lip member 386 is further provided with a pair of spring biased lock elements 390 as shown in FIGURES 26 and 27, which have lock notches 392 adapted to engage the edge of the tag in the locked position shown in FIGURE 27.

The tag holder is connected to the retainer support 360 by a pair of bolts 394. These bolts also serve to retain a tag holder handle 396 as shown in FIGURE 26.

The means for advancing the tag holder and the tag vertically, that is into and out of the jaw 112 of the character wheels, are best shown in FIGURES 31, 32, 38, 39, 41 through 46 and 49. This mechanism comprises a feed rack 400 mounted at the bottom of the carriage frame and extending axially from the front of the carriage frame to the rear as shown in the bottom plan view of FIGURE 42. This relationship is also shown in the sectional view of FIGURE 45. The rack has a rack blade element 401 extending to one side with the series of rack teeth 402 which are adapted to be engaged by a pair of pawls 404 and 406, the latter being slightly longer than the former. An advancing handle 408 is keyed to the end of the rack 400 as shown in FIGURE 42; a biasing spring 409 retains the handle in the unoperated position until it is operated against the action of the spring.

The two pawls 404 and 406 are retained against the bottom of the tag holder retainer 360 by a retainer plate 410 and a bolt 411 as shown in FIGURE 45. The pawls are each urged into contact with the teeth 402 of the vertical ratchet bar by means of two biasing springs 412 as best shown in FIGURES 43 and 44. The tag holder retainer support is biased to move to a rearward positon by means of a biasing spring 414 connected at one end to a stud 416 fixed to the bottom of the tag holder retainer and at its other end the spring is connected to an anchor element 418 at the bottom of the carriage frame as shown in FIGURE 42.

By means of this structure, when the handle 408 is depressed, the rack blade is moved downwardly in the direction of the arrow shown in FIGURE 45 out of engagement with the engaged pawl and the tag holder retainer, and the associated tag moves one-half notch in the direction of the arrow shown in FIGURE 44 where it is engaged by the other pawl. This relationship is established as the pawls 404 and 406 differ in length by what amounts to one-half notch. Thus, when one pawl is engaged and notched, the other is situated one-half the way between the notches as shown in FIGURES 43 and 44. This relationship provides for a stepwise advancement of the tag holder with first one pawl 404 and then the other pawl 406 being engaged by the ratchet teeth as the handle 408 is operated. In this operation the ratchet bar is swung from first one pawl to another in the slight degree of rotational movement afforded it by the movement of the handle.

Automatic vertical adjustment is also provided in conjunction with the operation of the carriage return key. This is effected through a dog element 420 fixed to the bottom of the spring biased vertical rack rod 400 best shown in FIGURE 39. This dog is adapted to contact a stud 422 extending from the rear of the carriage rail as shown in FIGURE 50, and, in so doing, the tag holder is advanced just as if the handle 408 had been operated.

Operation

First of all in order to operate the machine, the tag holder is first withdrawn to the front of the machine by grasping the handle 396 and moving it to the front as desired. Then a tag 370 is placed within the tray of the tag holder by withdrawing the lock handle 384 against the action of the biasing springs cocking the mechanism and, when the tag 370 is inserted, pressed downwardly at front center, the lock handle 384 is released into gripping engagement with the tag. The tag holder is then advanced to the rear of the machine so that the top portion of the tag is in a desired marking position. Appropriate horizontal centering of the tag in line with the operating elements, or striker members, 126 and 128 of the upper and lower operating arms, respectively, may be provided by operating the carriage frame release buttons 250 and 252 and moving the carriage frame to the desired position.

In order to feed the tag into the proper vertical alignment so that the tag is situated at the proper position underneath the character wheel, the vertical feed adjustment handle 408 is operated. This turns the rack bar 400 and puts the pawls 404 and 406 in feeding engagement one-half notch corresponding to one vertical line during each operation of the handle. The handle may be operated the desired number of times to provide the proper positioning.

The machine is turned on by operating the on-off switch 516. When so operated, the character wheel will be started in rotary operation by power furnished through the constantly rotating lower clutch head 158 and its associated pulley 108 through pulley belt 106 to the pulley block 102. The connection to the character wheels is then established by the friction clutch spring 104. This is the normal operation of the machine when no keys are depressed and it will also be noted that in addition to the character wheel being rotated in this condition the pulley wheel 302 is also kept rotating through the action of the pulley belt 304 connected to the double sheave pulley block 102.

When a character key 512 is operated, the associated characted element will brought into position underneath the striking elements of the operating arm by the electrical control system. This is effected as previously described in connection with FIGURE 56 by the closing of a circuit when the commutator segment 502 is contacted by the commutator brush 506. When this circuit is completed, the magnetic clutch 100 is actuated and the ratchet solenoid 174 is likewise actuated. Upon the actuation of the ratchet solenoid 174, the ratchet 178 is moved to engagement with a ratchet tooth 172 and the character wheel is stopped in the selected position.

The actuation of the magnetic clutch 100 is effected by the operation of its associated clutch solenoid 164, which operates the armature 162 to move the upper clutch head 156 into engagement with the lower clutch head 158 and thereby close the clutch. This closing or operation of the clutch furnishes power to the clutch shaft 150. In turn, the cam lobes 146 and 148 are rotated to move the cam yoke 144 and cam rod 130 forwardly. This spreads apart the slide blocks 136 and operates the upper and lower operating arms 122 and 124 to strike the character elements and cause a character to be punched upon the tag 370.

The tag holder and tag are then advanced automatically to the next horizontal space by the operation of the feed pawl 214, which engages the horizontal rack 210. The operation of the feed pawl is effected by the actuation of feed pawl rod 224 which is moved by the arm 230 connected to the bottom operating arm 124. This actuation causes the feed pawl lever to release from engagement with the horizontal rack which is then moved one notch by the spring biased tape 224.

It will be understood that the character keys are divided up in keys 512 and 513 so that twenty-two of the forty-four character keys operate with the ratchet solenoid 174 and the remaining twenty-two are connected to the solenoid 176, and the operation of the latter is similar to the former as will be readily apparent.

Should erasing be required, an erase key (not shown) may be operated. This key is connected just as are the other keys with respect to circuitry in FIGURE 56, but, instead of having a character element, the character head

118 is flat so that it may be used to hammer out or erase the previously typed character upon the tag.

The spacer bar 242 is operated where spaces are required in the normal fashion of typical typewriter usage. When so operated, a circuit is directly connected to the solenoid 236 which has an armature connected to the feed pawl rod 224 actuating the feed pawl 214 and permitting the carriage frame to be advanced one horizontal space. This circuitry and direct connection, as aforementioned, obviates the previously described circuitry so that the magnetic clutch need not be operated. Likewise the ratchet solenoids are not operated and the carriage frame is advanced one space independently of any other actuation of the typewriter mechanism.

For backspacing, the backspacer key 262 is operated. This actuates linkage through rod 264, the connecting rod 268, over to the slide bar 274. This, in turn, depresses the end of the pivot arm 280 so that it is engaged by the striker pins upon the pulley 302. This rotates the pivot pin and its mounting pivot block and the backspacer trigger 286 to move the backspacer bar 292. The degree of backspacing is effected by the cam plate 346 as the cam surface 354 defines the limit of travel of the pivot arm and the length of the backspace. This degree of backspace can be adjusted by moving the adjustment plate 346 so that the knife edge 350 engages a different adjustment groove upon the adjustment rod 352 fixed to the rear of the carriage rail at the left hand side of the machine.

The carriage return mechanism is controlled by the operation of the carriage return key 242. Actuation of this key closes a switch to the solenoid 312 which operates the clutch armature 316 causing friction clutch engagement of the tape reel 324 with the constantly rotating pulley shaft 330. This places tension upon the carriage return tape 326, moving the carriage frame from left to right across the machine. An automatic stop is provided by element 200 which is contacted by the stop member 198 on the carriage frame causing the actuation of the pivot rod 334, which, in turn, moves the arm 336 to disengage the latch 338 from the brake armature 316. The latch 338 is biased into normal latching engagement with the armature to hold it into engagement with the clutch 322 so that when the latch is disengaged the clutch is likewise disengaged.

When the carriage is returned to the desired tag position, the tag may be advanced vertically one more line underneath the character wheel by operation of the vertical tag holder advancement lever 408 in the manner previously described. Where several vertical lines of adjustment are desired, the handle is pushed repeatedly the desired number of times.

When the typing has been completed, the tag holder is moved forwardly by grasping it upon the handle 396 and withdrawing it to the front of the machine. The lock handle 384 is then withdrawn and the tag removed from its holder.

Various changes and modifications may be made within this invention as will be readiy apparent to those skilled in the art. Such changes and modifications are within the scope and teaching of this invention as defined by the claims appended hereto.

What is claimed is:

1. A marking machine comprising a pair of upper and lower character wheels supported upon an upright shaft, said character wheels being spaced from one another and being provided with mating character elements, a carriage frame provided with means for moving it horizontally across the machine on a carriage rail extending transversely across the machine upon which the carriage frame is slidably mounted, a toothed horizontal rack member extending transversely across the carriage frame and mounted upon it, and feed pawl means pivotally mounted upon the carriage rail engageable with the horizontal rack member, and backspacing means for moving the carriage frame to the right of the machine comprising a backspacing key operable to move a backspacer bar slidably mounted upon the carriage rail into engagement with the horizontal rack member and move it a predetermined length and a work piece holder mounted upon the carriage frame provided with means for advancing a work piece toward said character wheels and a tray portion of the holder between said character wheels, said tray having a central opening and carrying a workpiece tag having top and bottom surfaces exposed to the character elements, and tag retaining means mounted on the tray releasably engaging the tag to hold it in said tray against a tongue member in biased engagement with the tag, and a handle to operate said tag retaining means from a lock position to a releasing position.

2. A marking machine comprising a pair of upper and lower character wheels supported upon an upright shaft, said character wheels being spaced from one another and being provided with mating character elements, a carriage frame provided with means for moving it horizontally across the machine on a carriage rail extending transversely across the machine upon which the carriage frame is slidably mounted, a toothed horizontal rack member extending transversely across the carriage frame and mounted upon it, and feed pawl means pivotally mounted upon the carriage rail engageable with the horizontal rack member, and backspacing means for moving the carriage frame to the right of the machine comprising a backspacing key operable to move a pivot arm into engagement with striker means mounted on a rotary member, said pivot arm being connected to a back-up trigger operable to move a backspacer bar slidably mounted upon the carriage rail into engagement with the horizontal rack member and move it a predetermined length, and a work piece holder mounted upon the carriage frame provided with means for advancing a work piece toward said character wheels and a tray portion of the holder between said character wheels, said tray having a central opening and carrying a workpiece tag having top and bottom surfaces exposed in the character elements, and tag retaining means mounted on the tray releasably engaging the tag to hold it in said tray against a tongue member in biased engagement with the tag, and a handle to operate said tag retaining means from a lock position to a releasing position.

3. A marking machine comprising a pair of upper and lower character wheels supported upon an upright shaft, said character wheels being spaced from one another and being provided with mating character elements, a carriage frame provided with means for moving it horizontally across the machine on a carriage rail extending transversely across the machine upon which the carriage frame is slidably mounted, a toothed horizontal rack member extending transversely across the carriage frame and mounted upon it, and feed pawl means pivotally mounted upon the carriage rail engageable with the horizontal rack member, and backspacing means for moving the carriage frame to the right of the machine comprising a backspacing key operable to move a pivot arm into engagement with striker means mounted on a rotary member, means biasing said pivot arm out of engagement after it has once been contacted by the striker means, said pivot arm being connected to a back-up trigger extending through an opening in the carriage rail and operable to move a backspacer bar having a toothed portion slidably mounted upon the carriage rail into engagement of the toothed portion with the horizontal rack member and move it a predetermined length, and backspacing adjustment means comprising an adjustable cam plate having a cam surface engageable with the pivot arm to define its length of pivot travel and the length of the backspace travel to move the backspacer bar slidably mounted upon the carriage rail into engagement with the horizontal rack member and move it a predetermined length, said cam plate being pivotally mounted and having an adjustment portion selectively engageable in

notches on an adjustment stud to provide said selective degree of backspace adjustment, and a work piece holder mounted upon the carriage frame provided with means for advancing a work piece toward said character wheels.

4. A marking machine comprising a pair of upper and lower character wheels supported upon an upright shaft, said character wheels being spaced from one another and being provided with mating character elements, a carriage frame provided with means for moving it horizontally across the machine and means for returning the carriage, said carriage being slidably mounted upon a carriage rail extending transversely across the machine and said carriage return means comprising clutch engaged biasing means connected to the carriage, said biasing means comprising a tape reel engageable by a friction clutch mounted upon a rotary power shaft and being provided with a tape connected at one end to the reel and at the opposite end to the carriage, said friction clutch being operable by an armature arm operable by a solenoid actuated by a carriage return key, latch means comprising a pivotable latch having a notch receiving the armature arm biased into engagement with the armature arm for keeping the armature arm operated upon the release of the carriage return key and stop means operable by the carriage in a limiting position, said stop means comprising a pivotable striker arm moveable by contact with the carriage and being engageable with the latch to disengage it from the armature arm and thereby disengage the friction clutch, and a work piece holder mounted upon the carriage frame provided with means for advancing a work piece toward said character wheels.

5. A marking machine comprising a pair of upper and lower character wheels supported upon an upright shaft, said character wheels being spaced from one another and being provided with mating character elements, a carriage frame provided with means for moving it horizontally across the machine and a work piece holder mounted upon the carriage frame provided with means for advancing a work piece toward said character wheels, said work piece holder being adapted to receive a work piece tag and means for advancing the holder stepwise in a vertical line spacing direction across the carriage, said means comprising a tag holder retainer support having pawl means connected to said support engageable with a vertical toothed rack means connected to the carriage, said rack means being pivoted about a vertical axis, said pawl means comprising a pair of pawls biased into engagement with said rack, one of said pawls being positioned midway between engagement with the teeth in said rack when the other pawl is in engagement whereby the retainer may be advanced the length of half a tooth at a time, said rack means being pivotable by a handle to operate the pawl means and advance the tag holder stepwise along the rack means by a spring biasing action.

6. A marking machine comprising a pair of upper and lower character wheels supported upon an upright shaft, said character wheels being spaced from one another and being provided with mating character elements, a carriage frame provided with means for moving it horizontally across the machine and means for returning the carriage, said carriage being slidably mounted upon a carriage rail extending transversely across the machine and said carriage return means comprising clutch engaged biasing means connected to the carriage, said biasing means comprising a clutch driven reel having a tape member connected to the reel at one end and to the carriage at the other end urging the carriage to the right of the machine and a carriage return key having means for operating said clutch, and a work piece holder mounted upon the carriage frame provided with means for advancing a work piece toward said character wheels, said work piece holder being adapted to receive a work piece tag and means for advancing the holder stepwise in a vertical direction across the carriage, and a tray portion of the holder between said character wheels, said tray having a central opening and carrying a workpiece tag having top and bottom surfaces exposed to the character elements, and tag retaining means mounted on the tray releasably engaging the tag to hold it in said tray against a tongue member in biased engagement with the tag, and a handle to operate said tag retaining means from a lock position to a releasing position, said means comprising a tag holder retainer support having pawl means engageable with a vertical rack means connected to the carriage, said rack means being operable by a handle to operate the pawl means and advance the tag holder along the rack means by a spring biasing action, automatic holder advancing means actuated by the movement of the carriage in the carriage return operation, said automatic holder advancing means comprising a dog member fixed to the rack means and engageable with a stud member mounted upon the carriage rail to operate the pawl means and advance the holder along the rack means.

7. A marking machine comprising a pair of upper and lower character wheels supported upon an upright shaft, said character wheels being spaced from one another and being provided with mating character elements, a carriage frame provided with means for moving it horizontally across the machine and a work piece holder mounted upon the carriage frame provided with means for advancing a work piece toward said character wheels, said work piece holder being adapted to receive a work piece tag and means for advancing the holder stepwise in a vertical direction across the carriage, said holder comprising a body having a tray portion receiving a tag thereon, said tray portion having a central opening to expose the top and bottom surfaces to the character elements when it is advanced into operative relation with the character wheels, and tag retaining means mounted on the tag holder, said means comprising a retractable handle having a lock means engaging a front edge of the tag, said lock means being biased into engagement with said front edge of the tag, said tag holder being further provided with a tongue member engageable with the bottom of the tag and biased upwardly to move the tag out of the tray portion when the aforementioned handle is released.

References Cited by the Examiner

UNITED STATES PATENTS

712,125	10/1902	Elliott	197—6.6
1,407,492	2/1922	Steere	197—6.6
1,753,450	4/1930	Thompson	197—65
1,918,304	7/1933	Trego	197—91
1,961,156	6/1934	McCain	197—6.6
1,994,544	3/1935	Thompson et al.	197—85
2,391,777	12/1945	Gollwitzer	197—6.6
2,403,269	7/1946	Eddy	197—82
2,477,702	8/1949	Norton	197—91
2,872,015	2/1959	Toggenburger	197—91
2,900,066	8/1959	Tholstrup	197—82
2,973,853	3/1961	Freedson	197—6.6
2,982,390	5/1961	Beatty	197—6.6
3,001,624	9/1961	Guttel et al.	197—6.6
3,029,920	4/1962	Seifried	197—6.6

ROBERT E. PULFREY, *Primary Examiner*,