ALIGNMENT MEANS FOR A BED AND PLATEN PRINTING MACHINE

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ABSTRACT

An office machine for use in printing both numerical and symbol information on a document intended to be processed by automatic character recognition machines of the optical or magnetic type. The machine has a keyboard with a plurality of separate keybanks for entering the numerical or symbol information to be printed, keyboard sensing arms for determining the information entered into each keybank and a print wheel for each keybank of the keyboard and under the control of the keyboard sensing arms for setting up the information to be printed. A moveable platen cooperates with the print wheels to provide a printing couple for impressing the characters to be printed against a document. An inking ribbon lies between the line of characters set up on the print wheels and the document. When the printing couple is closed, the ribbon transfers ink to the document to be printed in a pattern corresponding to the characters on the print wheels. The Printing couple will print single and multiple documents such as a multi-part form with equal pressure and with controlled embossment of the print type into the document.

3 Claims, 16 Drawing Figures
ALIGNMENT MEANS FOR A BED AND PLATEN PRINTING MACHINE

BACKGROUND OF THE INVENTION

The present invention relates to a business machine for printing both numerical and symbol information onto a document intended to be subsequently handled by automatic character recognition equipment.

In present day banking institutions thousands of checks and deposit slips and other documents are processed automatically. The documents are usually encoded along the lower portion along the so-called clear band with magnetic ink character recognition MICR numbers and symbols in accordance with the requirements of the American Banking Association. On a check, for example, the numbers and symbols are placed in four different fields along the clear band. These four fields are... auxiliary "on-us," routing and transit, account number and amount. The first three fields are usually preprinted when the checks are supplied to a customer with the amount field being filled in during the posting operation.

Quite frequently a check will enter the automatic sorting and handling operations without the MICR encoding. These checks, which are commonly referred to as "exception items," must then be processed so that they will flow through the automatic handling equipment with a minimum of individual handling and expense.

Another source of exception items are new checking accounts. When a checking account is opened, the bank usually provides five or ten checks for use until the customer receives a supply of personalized preencoded checks. Each time the customer uses one of these temporary checks it must be handled as an exception item by the bank. The bank must encode each of the checks with automatic character recognition numbers and symbols to enable the checks to be processed automatically. While the banks will suffer this expense for the good will of the customer, these checks do present an expensive and time-consuming problem.

SUMMARY OF THE INVENTION

In accordance with the present invention, a business machine is provided for use in printing both numerical and symbol information on a document which is to be subsequently processed by automatic character recognition equipment. The machine has a keyboard made up of several banks of keys for encoding the information to be printed by the machine. A print wheel is operatively connected to each keyboard through individual keyboard sensing arms and associated sector and idler gears. A double toggle moveable platen is used to force the document to be printed against the inked surface of a suitable ribbon between the print wheels and document. The toggle resist point for the platen drive toggle is spring biased so that the platen will apply a relatively constant force against this type wheels whether a single document or a multi-part form is being printed upon.

The business machine of the present invention enables a bank to encode exception items with character recognition numbers and symbols as they enter the automatic processing operation so that all subsequent operations will take place without the necessity of individual handling.

The business machine also enables a bank to preencode the checks and deposit slips presented to a new customer so that they will appear as routine items in subsequent automatic processing.

The business machine also enables a bank to print single or multi-part forms in all fields with the same precision and pressure so that the automatic processing equipment will not generate an error signal due to poor printing or excessive embossment of the printed information.

The invention, both as to its organization and method of operation, together with further objects and advantages thereof, will best be understood by reference to the following detailed description taken in connection with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings:

FIG. 1 is a perspective view of the machine showing the full keyboard and adjustable gauging member for full field encoding;

FIG. 2 is an elevational view of the right side of the machine with the cover and a portion of the drive gear cut away to facilitate observation of the working parts;

FIG. 3 is an elevational view of the left side of the machine with the cover cut away;

FIG. 4 is an elevational view, partially in section, of a keybank;

FIG. 5 is an elevational view of the type set up and platen actuating mechanism;

FIG. 6 is an elevational view of the preliminary type alignment mechanism;

FIG. 7 is a top plan view of the type wheels and type aligning blade;

FIG. 8 is an elevational view of the type wheels, type aligning blade and blade actuating mechanism;

FIG. 9 shows the double toggle platen actuating and pressure control mechanisms;

FIG. 10 is a top plan view of the type wheels and printing platen which shows the bearings surfaces which control type embossment into the printed document;

FIG. 11 is a side elevation of the type wheels and platen in printing positions;

FIG. 12 is an elevational view showing the relation of the type, the ribbon spools, platen assembly, main shaft and ribbon feed mechanism;

FIG. 13 is a partial elevational view of the right side of the machine showing the motor bar, drive linkage and anti-trip interlock;

FIG. 14 shows the anti-trip interlock in and out of engagement with a link which controls the movement of the motor bar;

FIGS. 15a and 15b show the arrangement of the motor, gear reduction unit, clutch and clutch trip mechanism.

While the invention will be described in connection with a preferred embodiment, it will be understood that it is not intended to limit the invention to that embodiment. On the contrary, it is intended to cover all alternatives, modifications and equivalents as may be included within the spirit and scope of the invention as defined by the appended claims.
DETAILED DESCRIPTION OF THE INVENTION

Referring to FIG. 1, the document encoding machine is indicated generally by 20. The machine has a cover 21 and a base 23. A keyboard indicated generally by 25 is located on the sloping forward portion of the machine. The keyboard has a plurality of number and symbol keys 27 which are divided into individual keybanks. The keyboard also has a repeat bar 29 for reencoding the same information on several documents. A clear bar 31 is provided to manually clear the keyboard. The motor bar 33 for actuating the machine is positioned below the keys 27 so that it may be conveniently pressed by the thumb of the machine operator.

Above the keyboard and in clear view of the operator is a window 35 through which the operator can observe a signal flag which indicates the amount of inking ribbon remaining on the supply spool.

A removable gauge member 37 is mounted within a recess 39 across the top portion of the machine 20. The gauge 37 has a tab stop 41 for aligning the document to be printed relative to the print wheels in the machine. A window 43 in the gauge 37 indicates to the operator the field in which the document is being encoded and the location of the resultant printing relative to the clear band on the document.

In FIG. 2, the right hand side of the machine 20 is shown with the side portion of the cover 21 removed for observation of the working parts. In the description which follows, a part will be biased forward when it is drawn toward the front of the machine. A part will be biased rearward when it is drawn toward the back of the machine.

The machine has a right side frame member 45 made of heavy gauge steel and a lighter gauge steel right hand keyboard support frame 47. The depression of the motor bar 33 causes a trip link 49 to move toward the rear of the machine. The trip link 49 is biased in a forward direction by a spring 51 which is attached to a post 53 on the side frame 45 and a stud 55 on the side of the link 49. The trip link 49 has a notch 57 which holds a stud 59 on a bell crank 61. The bell crank 61 is mounted on the end of a shaft 63 and is spring biased in an upward direction by a coil spring 65 which is mounted between an ear 67 on the bell crank 61 and the stud 55. The vertical motion of the bell crank 61 is controlled by a cross bar 69 supported by a link 71. When a document is present in the gauge member 37, the interlock is released and the cross bar 69 can rise vertically within the slot 73. If the cross bar 69 and link 71 are locked in the lower position, the motor trip bar 33 cannot be depressed to actuate the machine.

If we assume that a document is within the gauge 37 and that the motor bar 33 can be depressed, the trip link 49 will move toward the rear of the machine where its end will push against a projection stud 75 on a bell crank 77 which is mounted on a cross shaft 79 which passes through the machine. As the upper portion of the bell crank 77 moves toward the rear, it carries a stud 81 into contact with a camming surface on a bell crank 83. The bell crank 83 is also mounted on the shaft 79 and is spring biased in a forward direction by a coil spring 85 which is attached between a hook portion 87 of the bell crank 83 and a post 89 on the side frame 45 of the machine. The bell crank 83 has a projecting portion 91 with a turned end which provides a contacting surface for the actuating member 93 on a microswitch 95.

The bell crank 77 is locked in either of two positions by a trip arm 97 which is pivotally mounted on a post 99 near the end of the side frame 45. The trip arm 97 has a stud 101 which is spring biased against the bifurcated end of the bell crank 77. Biasing is provided by a coil spring 103 hooked between the post 89 on the side frame 45 and the stud 101 on the trip arm 97. The post 89 passes through an aperture 105 in the bell crank 77. The aperture 105 provides sufficient clearance for the bell crank 77 to move between its two positions.

When the microswitch 95 is closed, electrical energy is supplied to the motor 107 which is mounted within the side frame of the machine and is supported by a plate 109 attached to the right hand side of the frame member 45. The motor 107 has a driving gear 111 which is connected by a geared belt 113 to a larger driven gear 115 which has been cut away to more clearly show the parts mounted behind this gear. The gear 115 is rotated in a counterclockwise direction as shown by the arrow.

When the motor bar 33 actuates the trip link 49 and causes it to move toward the rear of the machine, the bell crank 77 is moved from its first to a second position. As the bell crank 77 pivots, the stud 81 moves the bell crank 83 which in turn causes the projection 91 to close microswitch 95. Once the motor bar 33 has been actuated it can be released which causes the link 49 to be drawn back toward the front of the machine by the coil spring 51. The trip arm 97 with stud 101 holds the bell crank 77 in its second position until the cam 117, which is mounted on the main shaft 119, rotates and brings the surface of the cam into contact with stud 75 whereupon it positively drives the upper arm of the bell crank 77 toward the front of the machine returning the bell crank to its first position. As the bell crank 77 rotates, the stud 101 is moved from the upper to the lower bifurcation in the end of the bell crank 77 where it holds the bell crank until the motor bar 33 is again actuated.

The cam 117 which is mounted on the main shaft 119 performs three functions during a single rotation. As previously discussed, the cam drives stud 75 and in turn bell crank 77 back to a starting position during a course of rotation. The cam 117 also has a pair of oppositely disposed studs 121 and 123, respectively. As the cam rotates and comes in contact with stud 75 on bell crank 77, it tends to drive the upper portion of the bell crank 77 toward the front of the machine. As the bell crank moves, the stud 81 is drawn away from bell crank 83 which would cause projection 91 to lose contact with actuator 93 of microswitch 95 and in turn shut off the electrical power to the machine. To prevent this, the stud 121 contacts bell crank 83 and maintains the bell crank in contact with the actuating member of the microswitch until the machine has undergone a complete cycle.

During the rotation of the cam 117, the stud 123 comes in contact with anti-double trip arm 125 which is pivotally mounted at 127 on the machine frame 45. As the cam rotates it raises the rearward portion of the anti-double trip arm 125 forcing the forward portion down. The anti-double trip arm 125 is biased by a coil
spring 129 which is mounted between a post 131 on the machine frame 45 and a projecting stud 133 on the forward portion of the anti-double trip arm. The stud 133 extends above trip link 49 and depresses the rearward portion of the trip link so that cam 117 can drive stud 75 on bell crank 77 beyond and above the end portion of trip link 49 thereby allowing the bell crank 77 to be returned to its first position without coming in contact with the trip link. The machine can, therefore, only undergo one cycle of operation for each depression of the motor bar 33.

The document gauge 37 is retained in operating position within the machine by a spring biased bail 135 which is pivotally mounted on the side frames of the machine at 137. The bail 135 has a projecting portion 139 which cooperates with a surface on the gauge 37 to retain the gauge in the machine. When it is desired to remove the gauge 37 from the machine, for example, to place a new inking ribbon in the machine, the bail 135 is pushed toward the rear of the machine allowing the gauge member 37 to be lifted vertically clear of the machine.

Turning now to FIG. 3, the machine has a heavy steel left side frame 141 which supports a left keyboard support frame 143 and a left motor support 145. The left hand end of main shaft 119 projects through the side frame 141. A crank arm 147 is mounted on the main shaft 119 and is connected at 149 to a link 151 which is attached to a crank arm 153 mounted on the set up control shaft 155. The crank 147 rotates in a direction so as to move the crank 153 toward the front of the machine. A keyboard clear dog 157 is pivotally mounted on 159 on the crank 153. The keyboard clear dog 157 is spring biased by coil spring 161 mounted between a stud 163 on keyboard clear dog 157 and a stud 165 on crank arm 153. The spring 161 allows the keyboard clearing dog to rotate under keyboard clear arm 167 as the crank arm 153 is driven toward the forward portion of the machine. On the return stroke of the arm 153 the spring biases the remote portion of the keyboard clearing dog 157 in an upward direction so that it comes in contact with keyboard clearing arm 167 to automatically clear the keyboard 25.

The shaft 63 projects through the left side of the frame 141. A crank arm 168 is mounted on the shaft 63 and is attached to a link 169 which supports the left end of cross bar 69 in a slot 171 corresponding to slot 73 in right side frame plate 45.

As previously discussed, the preferred embodiment of the machine of the present invention is intended for use in encoding MICR characters on exception item checks which enter the automatic processing facilities in a bank. For this purpose, the machine has a keyboard made up of 16 separate keybanks, each of which has a key for zero and the digits one through nine and also the four symbols used in automatic check processing. Each keybank also has a 15th position which serves to lock the individual keybank and also provides an automatic blank stop for the particular keybank.

In FIG. 4 a partial sectional view of the keybank is shown as mounted in the machine. Each keybank is made from a vertical supporting plate 173 which is shown dependent from end supports 175 and 177. The lower portion of the keybank is supported by the channel-shaped member 179 which prevents the keybank from swaying on the supports 175 and 177. The three support members run across the width of the machine between the side frames 45 and 141 and are notched to receive and align each of the keybanks. The plate 173 is rolled over at the top to provide a guide for each of the key stems 181. The lower edge of the plate 173 is of concave arcuate shape, substantially concentric with a shaft 183 below it, and has fastened thereto a segment 185 likewise of arcuate shape, having slots through which the lower ends of the key stems 181 extend. Each key stem near its upper end is guided in a notch in the edge of the turned over plate 187 and extends upwardly beyond the rolled over portions of the plates 173 and 187 and is provided with a depressed key head or cap 189.

Near the front end of each keybank the plate 173 is offset laterally as at 191, and then extends forwardly again as at 193. A similar offset is provided at 195 toward the rear of the keybank with another forward extension 197. A slot is provided in the offsets 191 and 195 within which a locking bar 199 is guided and supported. The locking bar 199 is biased towards the front of the machine by a coil spring 201 which is attached to an ear 203, depending from the bottom of the locking bar 199, and an eye 205 formed within an aperture in the side of the plate 173. The locking bar 199 carries a series of laterally extending lugs 207, one just to the rear of each key stem, the spring 201 tends to pull the lugs 207 against each of the key stems 181. When a key is depressed, the lug 207 associated with the stem of that key will snap over the top of a shoulder 209 on the key stem, to hold the key depressed against the force of a coil spring 211 surrounding the lower end of the key stem and tending to push upwardly on the stem.

The shoulder 209 on each key stem is normally in contact with the lower side of the turned portion of the plate 173 and serves to limit the upward movement of the key stem under the influence of spring 211. When any one key is depressed, the locking lug 207 of the locking bar 199, by snapping over the shoulder 209, holds the key in depressed position. If a second key in the same keybank is depressed, an inclined surface 213 on the key stem, just below the shoulder 209, will contact with one of the locking lugs 207 and force the locking bar 199 in a rearward direction, thus releasing any key previously depressed in this same keybank, while the newly depressed key will be locked in the depressed position.

The locking bar 199 has a depending finger 215 formed near its rearward end. When the finger 215 is pushed to the rear by a flexible clearing member 217 mounted on the keyboard clearing yolk assembly 219, the locking bar 199 moves clearing the lug 207 away from shoulder 209 on any depressed key allowing the key stem to rise to its normal position. The keyboard clearing yolk assembly 219 is spring biased in a forward direction by a coil spring 221 which is attached to a post 223 on the inside of side frame member 141 and to tab 225 formed on the lower portion of the keyboard clearing yolk assembly. The forward portion of the keyboard clearing yolk assembly 219 is normally held against a cross shaft 227. When the bell crank 229 is depressed during a machine cycle by the keyboard clearing arm 167, shown in FIG. 3, the flexible member
217 pushes the finger 215 towards the rear of the machine allowing each key stem to return to its upright position.

When it is desired to encode the same number on more than one document, the repeat bar on the keyboard is depressed which causes the keyboard locking yolk assembly 231 to rotate on the cross shaft 233. The upper portion in the keyboard locking yolk assembly 231 comes in contact with the rear of dependent finger 215 on locking bar 199 and prevents it from being pushed to the rear by flexible member 217 on the keyboard locking yolk assembly 219. The flexible member 217 is made of spring steel and is sufficiently strong to release the locking bar but will flex if the bar is locked.

The keyboard locking yolk assembly can be brought into contact with the finger 215 on each keybank by depression of the repeat bar 29 on the keyboard or automatically by the operation of the machine. When the shaft 155 of the machine rotates, a cam 235, referring to FIG. 2, is caused to rotate in a forward direction. As the cam 235 rotates a cam follower 237 rides along the camming surface of the cam 235 and moves a bell crank 239 which causes the keyboard locking assembly to press against each of the dependent fingers 215 on the keybanks.

Each of the keybanks is provided with a locking member 241 which resembles a key stem 181, however, it is not adapted to carry a cap 189. The locking member 241 is urged in an upward direction by its spring 211 which forces a shoulder 243, formed on the member 241, into engagement with the upper surface of the rolled portion of plate 173. The shoulder 243 restricts the upward movement of the member 241. A notch 245 is provided in the rearward portion of the member 241 and is adapted to grip the rolled portion of the plate 173 when the member 241 is depressed. The depression of the member 241 causes shoulder 243 to align with the lugs 207 on the locking bar 199 preventing the upward motion of the locking bar by the flexible members 217 on the keyboard clearing yolk assembly 219. In order to release the individual keybanks the notch 245 has to be pulled clear of the plate 173 to allow the locking member 241 to rise removing the shoulder 243 from alignment with the lug 207 on the locking bar 199.

When a key stem 181 is depressed and held in place by the lug 207, a portion of the stem projects through arcuate member 185. Each key stem in passing through the member 185 is directed toward the center shaft 183 which supports a set up stop arm for each keybank of the machine. In the operation of the machine, the set up stop arms are caused to rotate and act as keyboard sensing arms for the information encoded in each keybank. As shown in FIG. 4, the set up stop arm 247 is in contact with the depressed portion of the key stem 181 which prevents any further motion of the stop arm.

The set up stop arms 247 are mounted on a cross shaft 183 which is supported between the side frame members 45 and 141. Each of the set up stop arms has a geared arcuate portion 249 and a projecting portion 251 with an offset lateral extension 253. The set up stop arms are rotatively mounted in the center of the machine with the lateral extensions 253 extending from the center in either direction to contact the more remote keybank assemblies. In order to provide room for the machine operator's fingers the spacing of the keys on the keyboard has to be wider than the spacing of the print wheels used to encode the document, the keyboard set up arms compensate for the difference in spacing bringing the information from each keybank to the center of the machine.

In the machine, the set up stop arms 247, the sector gears 259, the compound idler gears 263 and the print wheels 265 corresponding to each keybank are in alignment and are laterally spaced from each other by a distance corresponding to the spacing required in resulting printing on the document. In view of the close lateral spacing of the several gears in the machine, there is no room for the set up springs 267 to be directly associated with each sector gear 259. To provide the close spacing, the set up springs 267 (see FIG. 5) are alternately attached above and below a sector spring anchor bracket 269. A wire extension 271 extends from each coil spring 267 around a sheave 273 and is attached to each sector 259 at a cut-out portion 275. Each of the sheaves 273 are properly spaced and retained on a pivot shaft 277 below its associated sector gear 259.

The set up stop arms and gears are shown in the neutral position before the motor bar of the machine is actuated. The sector gears 259 are held in position by a cross shaft 279 which is supported by a pair of arms 281 which are pinned to the shaft 155 and rotate with it. The sector gears 259 are supported and aligned by the shaft 155, however they are free to pivot about the shaft under the influence of sector springs 267. On a forward stroke sectors 259 follow rod 279 until the motion is intercepted by a set up stop arm striking a depressed key stem. The rod 279 continues to move forward so that all of the set up stop arms corresponding to the several keybanks can sweep the entire sector portion 185 to sense for depressed key stems. As the sector gears 259 rotate they cause compound idler gears 263 to rotate in the opposite direction which in turn causes the type wheels 265 to rotate bringing the selected type into alignment with the platen. On the return stroke the sector gears 259 are picked up by the rod 279 and returned to the neutral position.

The print wheels must be accurately aligned relative to the line of print before the printing operation takes place so that the encoded MICR characters will be acceptable for automatic machine sorting and processing. It is therefore essential that the type wheels be aligned and locked in position before the printing portion of the machine cycle takes place. The alignment of the type wheels is carried out in two steps, that is, an initial and then final alignment.

Referring to FIG. 6, the compound idler gears 263 and type wheels 265 are set in the machine so that there is a slight amount of play between these gears to compensate for any eccentricities. The slack in the gears is then taken up during the alignment procedure.

When the main shaft 119 rotates in the counterclockwise direction, as shown in FIG. 6, it carries crank arm 147, link 151 and arm 153 which causes shaft 155 to rotate. The arm 281 is pinned to the shaft 155 and carries a spring biased cam 283. As the arm rotates toward the front of the machine, the raised camming surface on the cam 283 contacts the roller 285 mounted
on arm 287 causing the arm 287 to pivot about the shaft 289 carrying rod 291 into the alternate tooth space on the compound idler gear 263. The upper portion of the arm 287 is biased by a coil spring 293 to withdraw the rod 291 from the compound gear 263 when the arm 281 is returned to the neutral position. As mentioned previously, the shaft 155 has two arms 281 pinned to it on either side of the sector gears 259. Each arm 281 carries a spring biased cam 283 which in turn contacts the roller 285 on a pivotally mounted arm 287 on either side of the compound idler gears. The shaft 291 extends between the arms 287 and aligns all of the compound idler gears at the same time.

The cam 283 is normally in an eccentric position and is held there through tension. The rod 291 is brought into contact with gears 263 by the force of the springs 295 transmitted through cams 283 to rollers 285 and arms 287. The motion thus transmitted by two units on each side of the sector gears and compound idler gears insures firm pressure on the idler gears 263 without undue fixed stress. The alignment of the compound idler gears is the initial alignment previously referred to.

The final alignment of the type wheels is shown on FIGS. 7 and 8. An aligning blade 297 is supported and guided by a pair of slotted plates 299 which are attached to type supports 301 and 303. The guide plates 299 are adjustable laterally by an eccentric shaft 305. Pivotally mounted arms 287 have a projecting portion 307 which passes through an aperture in the aligning blade 297. The projection 307 has a spur which cooperates with a projection on the aligning blade 297 to support a spring 309 mounted within the aligning blade 297.

As the arm 281 moves, cam 283 strikes roller 285 causing arm 287 to pivot. As the arm 287 pivots, the rod 291 enters the alternate tooth space on the compound idler gear 263. The rod 291 seats itself in the alternate tooth space and the projecting portion 307 on the arm 287 applies pressure against springs 309 to force the aligning blade 297 into the type wheels. The slight amount of backlash which is provided by the positioning of the compound idler gears 263 and the print wheel 265 allows the print wheels to undergo a finite final alignment before the platen is actuated. On a return cycle both aligning rod 291 and aligning blade 297 are withdrawn from the idler gears and print wheels by the spring 311.

After the print wheels have been set up and aligned, the platen drive mechanism operates to bring the platen in contact with the document. Referring to FIGS. 5 and 9, a single drive actuating mechanism is shown. At the opposite end of main shaft 119 and adjacent to the inside of side frame 45 a similar drive mechanism is provided for controlling the right hand side of the platen member.

As the main shaft 119 rotates, it carries a toggle actuating cam 320 which is in contact with a cam roller 313 on lower toggle lever member 315. When the toggle actuating cam 320 reaches its high point, it causes toggle lever member 315 to align with the second lower toggle member 317 causing a toggle action against the upper toggle members 319 and 321. The two toggle linkages cause the platen supporting bail 323 to move carrying platen 325 into contact with a document between the platen and the type wheels 265. After the toggle actuating cam 311 passes center the spring 327 breaks the toggle alignment of the lower toggle pair causing the upper toggle to break, withdrawing the platen from the type wheels 265. The combination of two toggle pairs is necessary to provide the approximately 500 pounds of printing pressure necessary to print 16 eights on a document. The line of 16 eights is the worst case for the printing assembly with a single seven requiring the least amount of pressure.

The machine of the present invention is adapted to print on single forms or multi-part forms. Since one or many layers of paper will be within the printing couple formed by the print wheels and platen, means are provided in the machine to compensate for the difference in thickness. As the platen supporting bail 323 rotates about its supporting shaft 329, the first and second toggle drive members align forcing the platen against the document and type wheels. If several thicknesses of paper are between the platen and type wheels, a substantial amount of force is necessary to align the two pair of toggle members to drive the platen supporting bail. The lower toggle lever members 315 are joined by a cross shaft 331 which extends through an aperture 333 in the side frames 45 and 141 and is fixed to a lever arm 335. The lever arm 335 is pivotally mounted on the side frames at 337 and is biased in an upward direction by coil spring 339 which is attached to the end of the lever arm and to a post 341 on each side frame of the machine. The coil spring 339 tends to hold the shaft 331 against the top of the aperture 333 in the side frames. When the pair of toggle members encounter an excessive amount of pressure due to the presence of several sheets between the type members and platen, the shaft 331 which forms the toggle resist point is caused to move downward within the aperture 333 and against the pressure of coil spring 339. The coil spring 339 is a pressure release or limit for the platen 325. As the number of sheets between the type wheels and platen increases, the coil spring 339 will extend, releasing an incremental amount of pressure from the platen thereby maintaining a relatively constant printing force against the document.

When the type wheels and platen come together to print a document, the type carried by the type wheels 265 is forced into the document causing some embossment. The degree of embossment appears to increase with the number of carbon paper present as the carbon paper tends to be soft allowing the type face to penetrate more deeply into the papers. In order to control the degree of embossment of the documents, the type supporting members 301 and 303 have been cut back a small amount beyond the type face of the type carried by the type wheels 265. The cut back portion of the members 301 and 303 provides a bearer surface for the platen 325. Referring to FIGS. 10 and 11, the platen 325 is provided with a resilient face 343 which contacts the type wheels 265. The resilient face 343 is set within the platen 325. Beyond each end of the resilient portion the platen has a hard steel face 344 for pressing against the bearer surface on the type wheel supporting members 301 and 303. By bringing the two metal surfaces together, the degree of embossment of the type into the document is controlled regardless of the pressure applied by the platen.
The platen 325 is supported on the bail 323 by several adjusting screws 397. The screws 397 are provided with lock nuts 345 to hold them fixed in position after an adjustment has been made. By means of the adjusting screws 397 the platen can be aligned relative to the bearing surfaces on the type wheel supports 301 and 303 and the center portion of the platen can be leveled to prevent bending of the platen under the printing force. As previously mentioned, a pressure of approximately 500 pounds is required to print a row of 16 eights. This pressure is sufficient to deform the platen during continuous service if the center of the platen is not adjusted and supported by the screws 397 and lock nuts 345.

Through the use of the floating toggle resist point 331 and the platen drive mechanism and the use of bearing surfaces on the type wheel support members and platen, both the pressure and degree of embossment are controlled during each printing operation whether a single or multi-part form is being printed. The platen is also adjustably supported throughout its length to provide a uniform surface over a considerable period of constant use.

In the printing of MICR characters an inking ribbon is used which completely transfers the characters from the ribbon to the document being printed. After the document has been printed, the ribbon contains a void area corresponding to the print which has been removed from the ribbon. In view of this, the ribbon must be advanced after each print cycle to move a new unused area of the ribbon into position between the type wheels and the platen. Referring to FIG. 12, a ribbon supply reel 347 feeds a ribbon 349 through a guide member 351 and into the area between the type wheels 265 and the platen 325. The ribbon then proceeds through the machine to a pick-up spool associated with supporting ratchet 353. The take-up spool 355 is compressed between the take-up ratchet 353 and a spring biased roll support, not shown.

In order to properly time and provide for ribbon advancement, the toggle driving cam 320 which rotates on the main shaft 119 is used to drive a ribbon feed roller arm assembly 357 after it has passed the high point in closing the platen. As the cam 320 rotates it is continually in contact with a cam roller 359 on the ribbon feed roller arm bell crank 357. The bell crank 357 has a bifurcated end 363 which grips a stud 365 on the ribbon feed arm 367. The ribbon feed arm 367 is free to rotate about a shaft 369. As the arm 367 moves the spring biased dog 371 drives the ratchet 353 in a counterclockwise direction carrying a fixed amount of ribbon through the printing area. After the forward stroke of the ribbon feed arm 367, the arm is returned to the neutral position by a coil spring 373 which is attached to the stud 365 on feed arm 367 and to a post 375 on the inside of the left side frame 141. The spring 373 in drawing the feed arm 367 to the neutral position maintains cam roller 359 in continual contact with cam 320. In order to prevent the ratchet 353 from reversing during the return to neutral of the arm 367, a spring biased ribbon feed returning dog 377, which is mounted on a fixed arm 379, maintains continual contact with the ratchet 353 and prevents it from rotating in the opposite direction.

As previously stated in the discussion of FIGS. 2 and 3, the machine of the present invention can be operated only when a document is present within the gauge 37. The machine is provided with an interlock mechanism to prevent damage to the type wheels through inadvertant operation of the machine without a document being present between the type wheels and the platen. The interlock retards the forward motion of the motor trip link 49 by preventing movement of the bell crank 61 and link 71. Referring to FIGS. 13 and 14, the machine is provided with a pair of interlock arms 381 which define the outside limits of the printing area between the type wheels 265 and the platen 325. The interlock arms 381 are provided with a document sensing arm 385 and with a counterbalancing arm 387. When a document is placed into the printing station of the machine, the weight of the document is sufficient to force the document sensing arm 385 down causing arm 381 to pivot and remove the shoulder on depending arm 389 from contact with the cross bar 69. The links 71 and 169 and the cross bar 69 are free to rise which allows motor trip link 49 to move towards the rear of the machine. When a document is removed from the machine, the counterbalance arm 387 causes the interlock arm 381 to reset placing the shoulder formed on the depending arm 389 into a blocking position relative to the cross bar 69.

In the operation of the machine, referring to FIGS. 2, 15a and 15b, when the motor bar 33 is depressed, the trip link 49 moves toward the rear of the machine where the end of the trip link contacts the stud 75 on a bell crank 77 which is fixed on a cross shaft 79. As the upper portion of the bell crank 77 moves, it causes shaft 79 to rotate which releases the clutch trip arm 391 from engagement with a stop on a single revolution clutch 393. The engagement of the clutch causes the main shaft 119 to rotate initiating the machine functions. The machine is provided with a gear reduction system 395 to reduce the speed of the motor 109 which provides the torque necessary to operate the machine. When the cam 117 rotates and returns bell crank 77 to its start position, the arm 391 is brought into position to reengage the stop arm on the clutch 393 to stop further rotation of main shaft 119.

The description of the machine of the present invention has been directed primarily to its use in encoding exception items which occur in the automatic document processing systems in a bank. Clearly it is within the scope of the present invention to use the machine for encoding all types of data onto documents. It is apparent that many changes and modifications of the several features described herein may be made without departing from the spirit and scope of the invention. It is, therefore, apparent that the foregoing description is by way of illustration of the invention rather than limitation of the invention.

While a particular embodiment of the machine of the present invention has been shown, it will be understood, of course, that it is not desired that the invention be limited thereto, and it is, therefore, contemplated by the appended claims to cover any such modifications as fall within the true spirit and scope of the invention.

What is claimed is:

1. A business machine for use in printing numerical and symbol information on a document comprising:
3,712,211

a keyboard having several banks of manually operable keys for selecting the information to be printed on a document;
a keyboard sensing arm for each bank of said keyboard, said sensing arms being mounted for rotation about a common shaft below said keyboard, the rotation of each sensing arm being stopped by a selected key in each keybank on said keyboard;
a sector gear for each keyboard sensing arm, said sector gears being mounted for rotation about a common shaft, the amount of rotation of each sector being controlled by the rotation of each keyboard sensing arm;
an idler gear for each sector gear, said idler gear being mounted for rotation about a common shaft, the amount of rotation of each idler gear being controlled by the rotation of each sector gear;
a print wheel corresponding to each bank of said keyboard, the print wheels being mounted for rotation about a common shaft, the amount of rotation of each print wheel being controlled by the rotation of said idler gears;
means providing an initial and a final alignment adjustment of said print wheels relative to the line of print on said document prior to the printing operation;
said initial alignment means comprising an elongate member spring biased into transverse aligning, meshing engagement with the teeth of said idler gear;
said final alignment means comprising a flat, planar member slottedly guided and spring biased into aligning engagement with said print wheels; and
a moveable platen operatively associated with said print wheels and adapted to force a document to be printed against said print wheels.

2. The invention as set forth in claim 1 wherein said initial alignment means further comprises:
cam means operable in conjunction with said initial alignment means to cause same to engage and align the teeth of said idler gears.

3. A business machine for use in printing numerical and symbol information on a document comprising:
a keyboard having several banks of manually operable keys for selecting the information to be printed on a document;
a keyboard sensing arm for each bank of said keyboard, said sensing arms being mounted for rotation about a common shaft below said keyboard, the rotation of each sensing arm being stopped by a selected key in each keybank on said keyboard;
a sector gear for each keyboard sensing arm, said sector gears being mounted for rotation about a common shaft, the amount of rotation of each sector being controlled by the rotation of each keyboard sensing arm;
an idler gear for each sector gear, said idler gears being mounted for rotation about a common shaft, the amount of rotation of each idler gear being controlled by the rotation of each sector gear;
a set up spring for each sector gear for biasing each said gear to a neutral position relative to the idler gear with which it is associated;
extension means coupling each said sector gear to each said spring, each spring being disposed alternately above and below a common anchor member extending transversely of said machine whereby said gears may be close spaced without interfering with the action of said springs;
a print wheel corresponding to each bank of said keyboard, the print wheels being mounted for rotation about a common shaft, the amount of rotation of each print wheel being controlled by the rotation of said idler gears; and
a moveable platen operatively associated with said print wheels and adapted to force a document to be printed against said print wheels.

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