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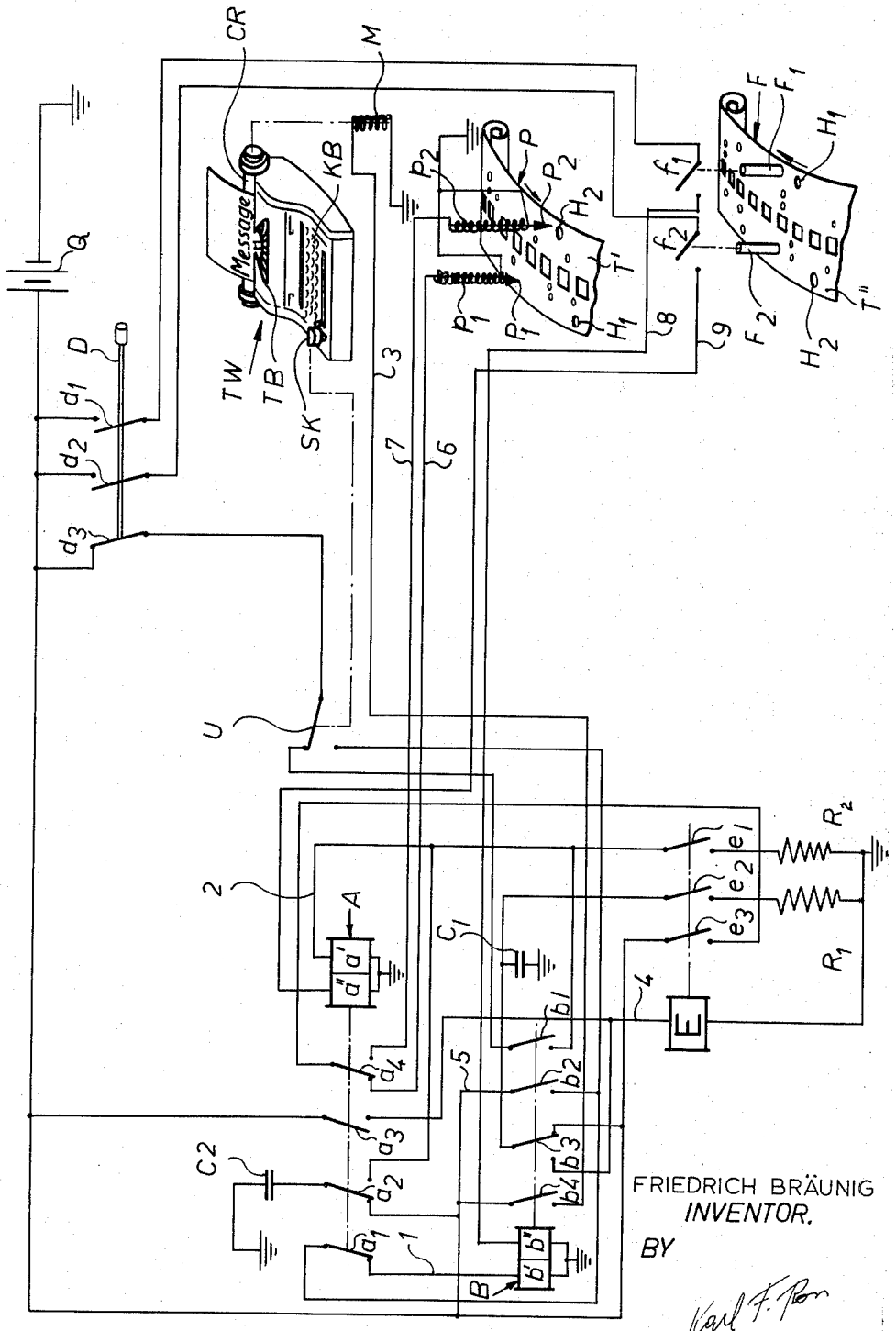

FRIEDRICH BRÄUNIG
INVENTOR.

BY

Karl F. Bon

AGENT

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CAPITAL-SHIFT MECHANISM FOR CODE PRINTER

Friedrich Bräunig, Wilhelmshaven, Germany, assignor to Olympia Werke A.G., Wilhelmshaven, Germany, a corporation of Germany

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My present invention relates to a code printer wherein the keys of a typewriter control the elements of a coder (e.g. the punches of a tape perforator) as well as the associated type bars for registering character entries on a recording medium while simultaneously printing a directly readable text on a message sheet. A system of this character has been described, for example, in U.S. Patent No. 2,980,225, issued April 18, 1961.

When in the operation of the typewriter keyboard it becomes necessary to shift from lower-case characters to capitals or upper-case characters, or vice versa, the operator must depress or release the usual shift key which alters the position of the sheet-holding carriage roller of the machine relative to the nest of type bars. At the same time a shift or unshift signal must be transmitted to the coder for the recording of a corresponding "upper case" or "lower case" entry.

It is the general object of my invention to provide simple and effective means for concurrently altering the carriage position and actuating the coder in the aforedescribed manner upon a mere depression or release of the shift key.

It is also an object of this invention to adapt the aforestated improvement to a system wherein the type bars are electrically actuatable not only by the keyboard but by a decoder to which a previously marked recording medium is fed, such adaptation involving the provision of a circuit arrangement whereby the means for altering the carriage position can be actuated alternately by the shift key and by the sensing elements of the decoder responding to upper-case and lower-case entries on the recording medium.

In accordance with this invention I provide a solenoid or equivalent electrical actuator for the carriage shift and, in combination therewith, a set of circuit elements such as relays responsive to the operation of a shift-key-controlled switch for maintaining the carriage-shift actuator in either of two conditions, depending upon the switch position, and for momentarily responding to any change in this switch position to create a momentary impulse which energizes the coder and causes the recording of a corresponding entry.

In a preferred embodiment I utilize a set of three relays of which the first is maintained in either its energized or its de-energized state for prolonged periods, i.e., for as long as the key switch occupies one or the other position, while the second relay is momentarily energized upon each switchover to generate a coding impulse and the third relay responds only to one type of switchover, e.g., the one which results in the de-energization of the first relay, to change the connections between the second relay and the coder whereby the entry to be made on the recording medium is suitably modified. In order to enable the first relay to respond also to lower-case and upper-case shift signals when the type bars are controlled by a decoder, I prefer to provide the first relay with a holding circuit which is broken by the third relay when the latter is briefly operated by one of the two shift signals. In this case it is advantageous to provide two timing circuits, one for the second relay and the other for briefly extending the operating period of the third relay beyond the de-energization of the first relay, in order to generate pulses of proper duration for the actuation of the coding elements. The timing circuits may simply comprise condensers adapted to discharge through the windings of the respective relays in parallel with suitable resistances.

The invention will be described in greater detail with reference to the accompanying drawing the sole figure of which shows a circuit diagram of a preferred embodiment.

The system illustrated in the drawing comprises a conventional electric typewriter TW with keyboard KB, a set of type bars TB and a carriage roller CR adapted to hold a message sheet. The carriage roller CR can be elevated or depressed relatively to the associated type-bar nest by means of a solenoid M.

A coding device has been shown schematically as a perforator P with the usual set of punches of which only two, designated P_1 and P_2, have been illustrated. These punches are controlled by solenoid coils p_1, p_2 and serve to perforate a tape T' which is advanced in known manner in the direction of the arrow. A corresponding reader F, provided with the usual sensing pins of which again only two have been illustrated at F_1 and F_2, serves as a decoder for the perforations entered on a tape T'' previously marked by perforator P or by a similar coder. The punches P_1, P_2, etc., are actuated by the keys of keyboard KB, over known circuits not further illustrated, concurrently with the type bars TB corresponding to the depressed keys.

The keyboard KB includes a shift key SK which controls a reversing switch U. A source of power, illustrated schematically as a battery Q, serves to energize three relays B, E and A under the control of switch U. Relays B and A are each provided with two windings b', b'' and a', a'', respectively, of which the windings b'' and a'' are energizable via respective leads **8** and **9** by switch contacts f_1 and f_2 respectively controlled by sensing pins F_1 and F_2; the energizing circuits for these windings are interrupted at contacts d_1, d_2 of a read-write switch D when the latter is in its illustrated recording position in which another contact d_3 thereof connects the armature of switch U to battery Q. Upon the reversal of switchover means D, decoding contacts such as f_1, f_2 controlled by corresponding sensing pins of reader F operate in conventional manner to generate character signals for the selective actuation of type bars TB in order to reproduce the message encoded on tape T''.

When the typewriter TW is in use, any depression of shift key SK causes a reversal of the position of switch U whereupon a circuit is closed for the energization of the first relay B from battery Q via switch contact d_3, switch U in its alternate position, and first circuit means including armature a_1 and back contact of relay A, conductor **1** and winding b' to ground. Relay B attracts its armatures b_1–b_4 which initiates the following operations:

A first timing condenser C_1, previously charged from battery Q over back contact and armature b_3 of relay B, now discharges through the front contact of that armature, a lead **4** and the winding of the second relay E to energize the latter. Solenoid M is energized by way of armature b_4 and its front contact, over a conductor **3**, to change the position of carriage roller CR, e.g., to raise it into its shifted position for the printing of capitals or upper-case characters. Relay E, in attracting its armatures e_1–e_3, energizes the winding p_1 of punch P_1 in a circuit extending from battery Q over armature e_3 and its front contact, armature a_4 of the third relay A and its back contact, and a conductor **6** to ground through winding p_1. Simultaneously the armature e_2 of relay E engages its front contact to accelerate the discharge of condenser C_1 by connecting it to a first timing resistor R_1. Thus, relay E releases after a brief interval, which may be of the order of 30 milliseconds, so that only a short pulse passes through the perforator winding p_1. The

punch P_1 thus perforates the tape T' to produce a hole H_1 which is assumed to constitute the code for upper-case characters. Relay B remains locked in a holding circuit including a conductor **5**, its own armature b_2 and front contact, and the armature a_1 of relay A whose back contact is tied to conductor **1**; thus, the energization of relay B is unaffected by any partial release of shift key SK which does not involve a full reversal of switch U.

When the shift key SK is subsequently released, switch U returns to its illustrated position and closes a circuit for winding a' of relay A via a conductor **2** and the armature b_1 of relay B on its front contact. Relay A, in attracting its armatures a_1–a_4, breaks the holding circuit of relay B at armature a_1. Armature a_3, over its front contact, connects battery Q to conductor **4** so as to re-energize relay E. A second timing condenser C_2, heretofore charged from battery Q via the back contact of armature a_2, now discharges through the front contact of that armature and conductor **2** to maintain the winding a' energized after its original operating circuit has been broken at armature b_1. Relay E, by attracting its armature e_1 which is tied to lead **2**, now connects a second timing resistor R_2 to condenser C_2 in parallel with winding a', thereby accelerating the discharge of the condenser and limiting the length of energization of relay A. A brief pulse is now transmitted from battery Q via armature e_3 and its front contact, armature a_4 and its front contact and a conductor **7** to the grounded winding p_2 of punch P_2 whereby a hole H_2 representing the lower-case code is perforated in the tape T'. Relay E releases with relay A as its energizing circuit is opened at armature a_3. Conductors **6** and **7** thus form part of a pair of alternate operating circuits for the coding means P, these operating circuits being respectively established by second and third circuit means including individual reversing contacts a_4 of relay A and common make contacts e_3 of relay E.

When the switch D is thrown into reading position, a hole H_1, detected by sensing pin E_1 on the tape T'', causes the momentary closure of contacts f_1 to energize via lead **8** the winding b'' of relay B, the latter thereupon maintaining itself over the aforedescribed holding circuit **5**, b_2, a_1, **1**, b'. A subsequent sensing of a hole H_2 by pin F_2 leads to the temporary closure of contacts f_2 whereby, via lead **9**, winding a'' is energized so that relay A at its armature a_1 breaks the holding circuit of relay B. The switch means M is thus alternately energized and de-energized in response to arrival of perforations H_1 and H_2, respectively, under their corresponding sensing pins.

My invention is, of course, not limited to the specific embodiment described and illustrated but is susceptible of numerous modifications which will be readily apparent to persons skilled in the art and are intended to be encompassed within the spirit and scope of the appended claims.

I claim:

1. In a code printer, in combination, a typewirter provided with a keyboard, type bars on said typewriter controlled by said keyboard and provided with upper-case and lower-case characters, a carriage on said typewriter having two positions relative to said type bars for the printing of lower-case and upper-case characters, respectively, shift means for relatively displacing said carriage and said type bars into either of said positions, a shift key of said keyboard, coding means electrically controlled from said keyboard for registering on a recording medium a variety of character entries in addition to a lower-case entry and an upper-case entry respectively representative of said positions, switch means coupled with said shift key for selective displacement thereby into an upper-case position and a lower-case position, first circuit means controlled by said switch means and coupled to said shift means for enabling the printing of upper-case characters and of lower-case characters in said upper-case position and said lower-case position, respectively, normally unoperated second circuit means coupled to said coding means and momentarily operable by said first circuit means upon displacement of said switch means into said upper-case position for producing said upper-case entry substantially concurrently with a corresponding actuation of said shift means by said first circuit means, and normally unoperated third circuit means coupled to said coding means and momentarily operable by said first circuit means upon displacement of said switch means into said lower-case position for producing said lower-case entry substantially concurrently with a restoration of said shift means by said first circuit means.

2. The combination according to claim **1** wherein said first circuit means includes a first relay connected to be energized in one of said positions of said switch means, said first relay having contacts for the control of said shift means; said second and third circuit means including a normally deenergized second relay, first timing means actuatable by said first relay upon the energization thereof for momentarily energizing said second relay, a normally deenergized third relay energizable in the other of said positions of said switch means via a circuit closed by said first relay in its energized state, said third relay having contacts connected to de-energize said first relay upon the energization of said third relay, and second timing means actuatable by said third relay for briefly extending its own energized state beyond the de-energization of said first relay.

3. The combination according to claim **2** wherein said third relay has contacts for energizing said second relay for the duration of its own energization, said second and third circuit means including make contacts of said second relay and reversing contacts of said third relay in series with said make contacts for establishing a pair of alternate operating circuits for said coding means.

4. In a code printer, in combination, an electric typewriter provided with a keyboard, type bars on said typewriter having signal-responsive actuating means controllable by said keyboard, said type bars being provided with upper-case and lower-case characters, a carriage on said typewriter having two positions relative to said type bars for the printing of lower-case and upper-case characters, respectively, shift means for relatively displacing said carriage and said type bars into either of said positions, a shift key on said keyboard, coding means electrically controlled from said keyboard for registering on a recording medium a variety of character entries in addition to a lower-case entry and an upper-case entry respectively representative of said positions, switch means coupled with said shift key for selective displacement thereby into an upper-case position and a lower-case position, first circuit means controlled by said switch means and coupled to said shift means for enabling the printing of upper-case characters and of lower-case characters in said upper-case position and said lower-case position, respectively, normally unoperated second circuit means coupled to said coding means and momentarily operable by said first circuit means upon displacement of said switch means into said upper-case position for producing said upper-case entry substantially concurrently with a corresponding actuation of said shift means by said first circuit means, normally unoperated third circuit means coupled to said coding means and momentarily operable by said first circuit means upon displacement of said switch means into said lower-case position for producing said lower-case entry substantially concurrently with a restoration of said shift means by said first circuit means, decoding means responsive to respective entries on said recording medium for generating character signals adapted to actuate said type bars in addition to a lower-case shift signal and an upper-case shift signal, and contacts coupled with said decoding means and connected to control said first circuit means for actuating the latter in conformity with said shift signals.

5. The combination according to claim **4** wherein said first circuit means includes a first relay; switchover means

for selectively connecting said first relay to a source of power by way of said switch means for energization in one of said positions thereof and by way of said decoding means for energization in response to one of said shift signals, said first relay being provided with locking contacts for completing a holding circuit therefor and with other contacts for the control of said shift means; said second and third circuit means including a normally de-energized second relay, first condenser means provided with a normally effective charging circuit and discharge-able through said second relay by contacts of said first relay upon the energization of the latter for momentarily energizing said second relay, a normally de-energized third relay provided with an energizing circuit including make contacts of said first relay, said energizing circuit being selectively extendable by said switchover means to said switch means for completion in the other of said positions thereof and to said decoding means for completion in response to the other of said shift signals, said third relay having break contacts included in said holding circuit for de-energizing said first relay upon the energization of said third relay, said third relay being further provided with holding contacts for completing a temporary holding circuit therefor, and second condenser means in said temporary holding circuit provided with a normally effective charging circuit and discharge-able through said third relay by said holding contacts thereof for briefly extending the energized state of said

third relay beyond the de-energization of said first relay, said third relay also having contacts for energizing said second relay for the duration of its own energization, said second and third circuit means including make contacts of said second relay and reversing contacts of said third relay in series with the last-mentioned make contacts for establishing a pair of alternate operating circuts for said coding means.

6. The combination according to claim **5**, further comprising first and second resistance means respectively connectable across said first condenser means by said second relay and across said second condenser means by said second and third relays in their energized state for timing the duration of said state.

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ROBERT E. PULFREY, *Primary Examiner.*

ROBERT A. LEIGHEY, *Examiner.*