Nov. 24, 1959 C. POHL ET AL 2,914,160

CONTROL APPARATUS FOR ELECTRIC TYPEWRITERS

Filed Nov. 7, 1957 4 Sheets-Sheet 1

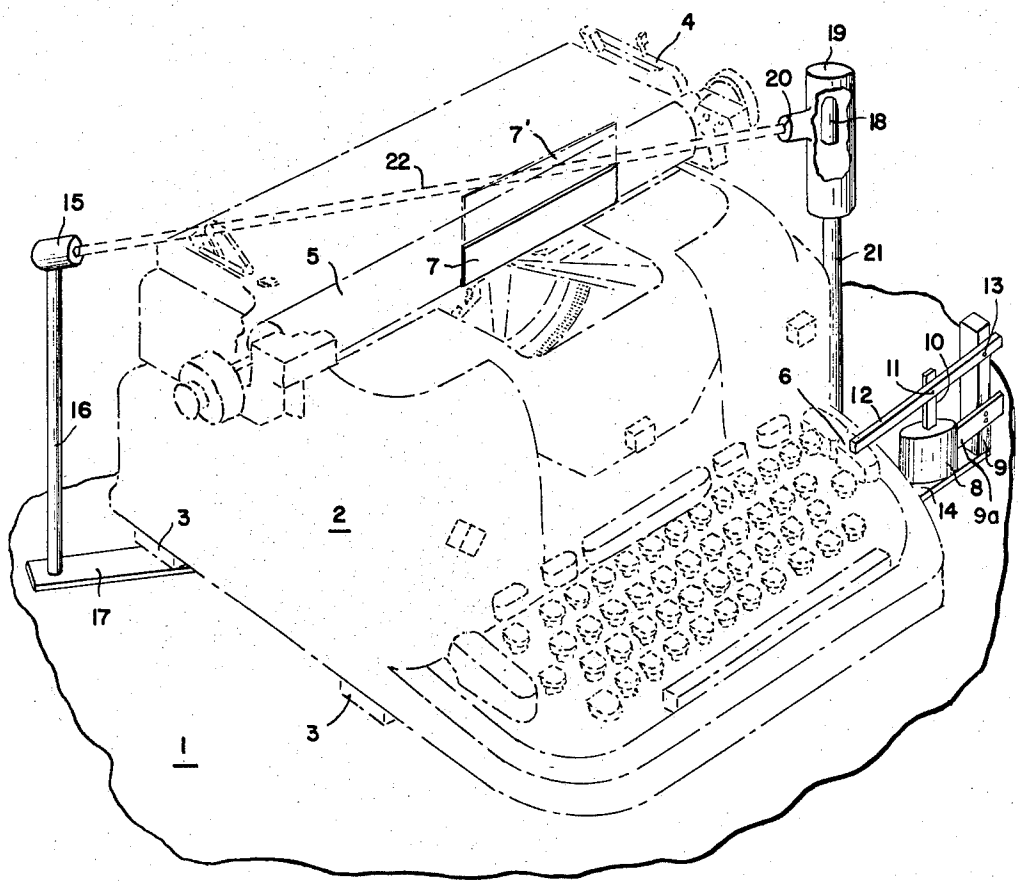


FIG. 1.

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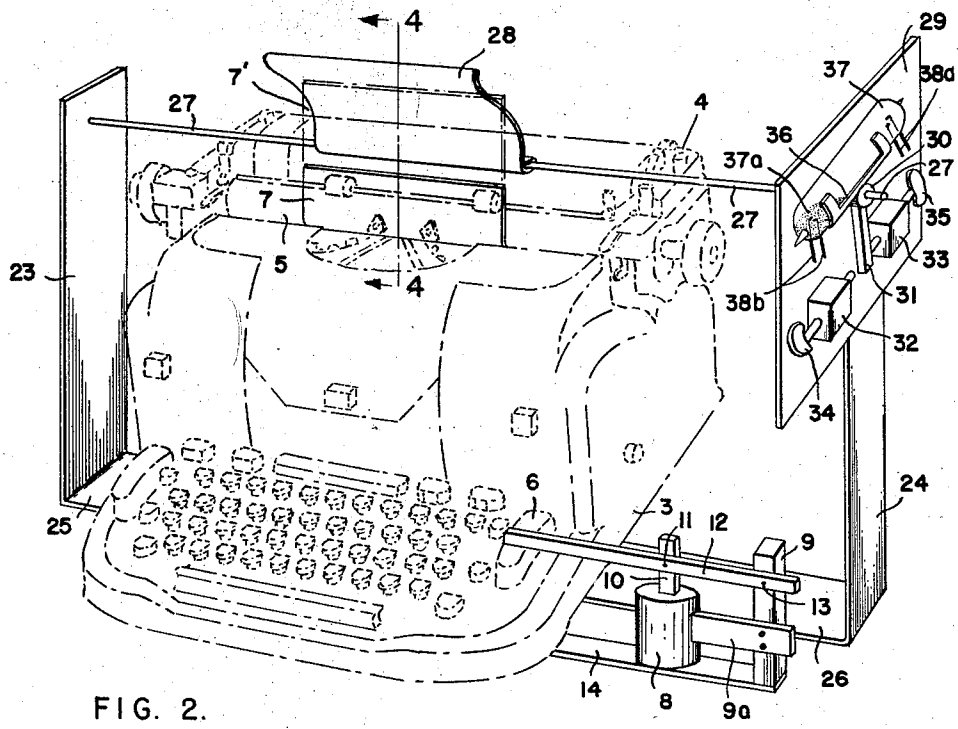


FIG. 2.

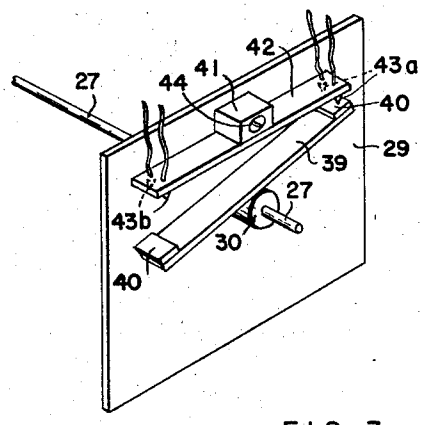


FIG. 3.

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CONTROL APPARATUS FOR ELECTRIC TYPEWRITERS

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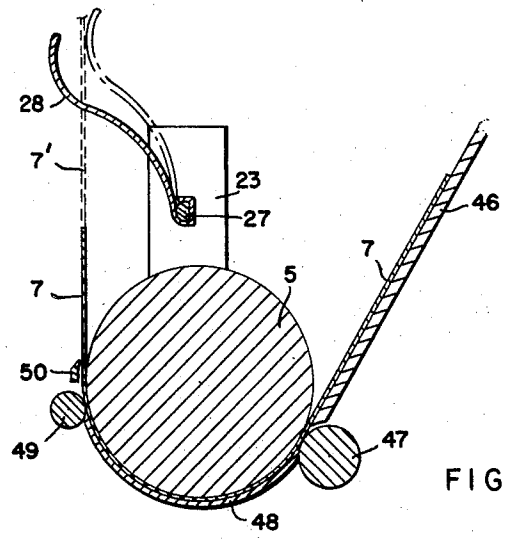


FIG. 4.

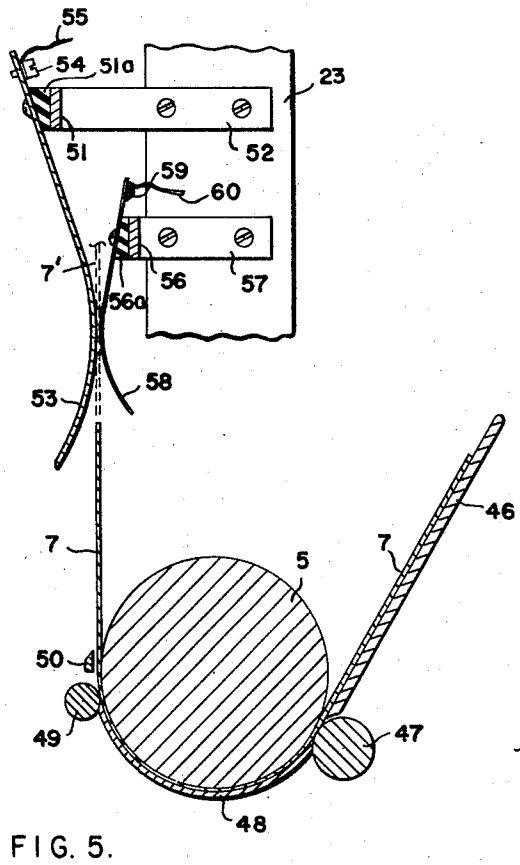


FIG. 5.

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CONTROL APPARATUS FOR ELECTRIC TYPEWRITERS

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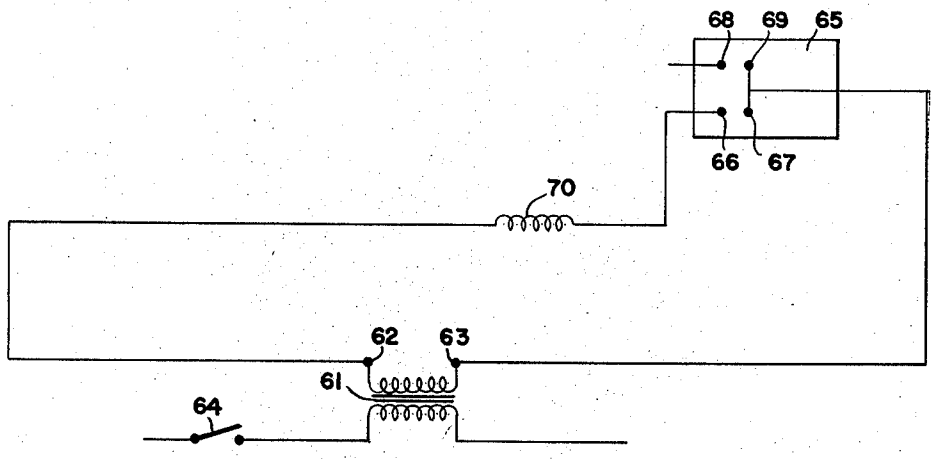


FIG. 6.

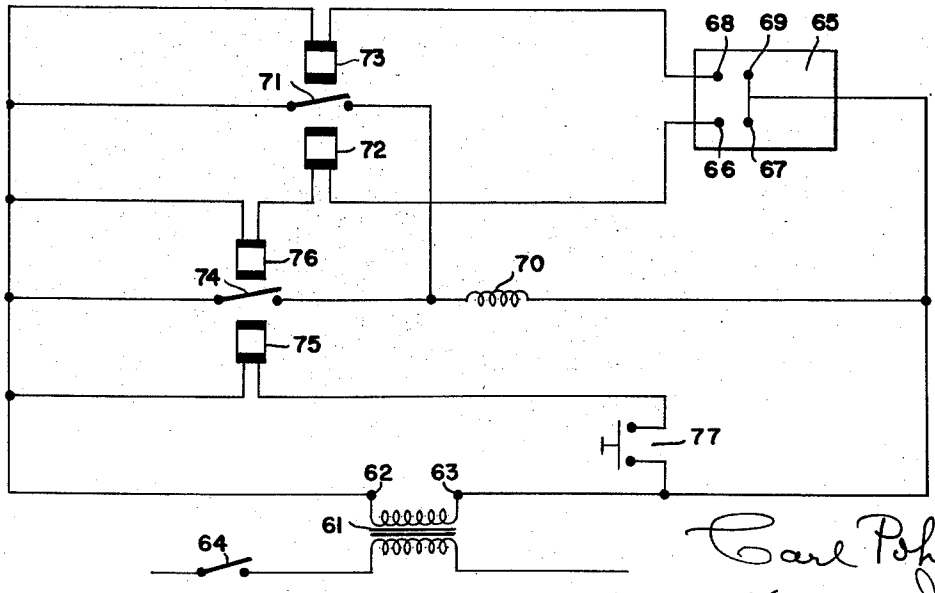


FIG. 7.

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United States Patent Office 2,914,160
Patented Nov. 24, 1959

2,914,160

CONTROL APPARATUS FOR ELECTRIC TYPEWRITERS

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Application November 7, 1957, Serial No. 695,037

7 Claims. (Cl. 197—114)

This invention relates to apparatus for automatically controlling the initial positioning of work pieces, such as envelopes, cards or sheets of paper, in a typewriter.

It comprises electrically activated mechanism, and is intended primarily to be used in conjunction with what is commonly known as an "electric typewriter," which is currently well known and in wide use, being a typewriter so constructed and equipped that substantially all movements of its platen and carriage and type bars are actuated by electric power or by springs tensioned from time to time by the application of electric power, in response to impulses delivered to keys included in or located near the typewriter keyboard; such impulses being delivered to said keys manually, or delivered to said keys or to parts with which they are individually and operatively connected, by accessory mechanisms which accomplish in conjunction with such a typewriter what is commonly known as "automatic typewriting" from master records.

This invention is intended to be operable in conjunction with conventional electric typewriters without the necessity of any alteration therein or permanent attachment thereto, any alterations in or permanent attachment to the co-operating typewriter being optional.

A principal object is to cause a cylindrical typewriter component known as a platen, when it is being rotated by electrically powered means comprised in the same typewriter and which is moving a work piece around its cylindrical surface, automatically to stop rotating precisely when the said work piece has advanced to the desired position for the imprinting of the first line of indicia thereon, regardless of the timing of the introduction of such work piece into the typewriter mechanism.

Devices heretofore reduced to practice for this purpose have provided apparatus by which the entry of a work piece into the typewriter is permitted to occur only in synchronization with the movement of mechanism adapted to subject the platen to a uniform rotational motion relative to its position at the instant of such entry, the amount of such rotational motion being determined by the presetting of such mechanism. Such apparatus is relatively complex, requiring many parts, is relatively slow in operation, and involves modifications in or attachments or additions to the structure conventionally comprised by the typewriter; whereas, as stated, the present invention has the object and advantage of being adapted to operate in conjunction with conventional electric typewriters without any alteration therein or permanent attachment thereto.

Furthermore, such heretofore-developed apparatus is not sensitive to the presence or absence of a work piece in front of the platen, and hence is capable of completing its operating cycle in the absence of any work piece. It also involves the hazard of failure of the mechanism to position the work piece properly in case of inaccurate articulation of the work piece with the synchronizing apparatus, or any accidental variation or failure in the functioning thereof.

The present invention is not dependent upon synchronization of the entry of the work piece with any particular rotational position of the platen, and does not complete its operative cycle by stopping the rotation of the platen unless and until a work piece is actually present and in the desired position.

In general, manual control conditioned by visual observation has heretofore been necessary to bring about the proper amount of travel, and stoppage of travel, of a work piece around the platen of a typewriter so that the work piece will be held stationary, relative to the path of such travel, at the proper initial position for the imprinting of the first line of indicia.

The operation of this invention is such as to cause the travel of each successive work piece around the platen of an electric typewriter to continue until and to stop when such work piece is appropriately positioned for the imprinting of the first line of indicia thereon, interposing no obstacle or interference to the further operation of such typewriter, such as the writing of additional lines of indicia, as long as the work piece remains operatively gripped by the typewriter mechanism, and automatically resetting itself to readiness for the next succeeding work piece immediately upon the removal of any particular work piece from the typewriter.

In the accompanying drawings:

Fig. 1 is a perspective view of an electric typewriter and of an embodiment of this invention positioned to operate in conjunction therewith; the exterior of one part of the invention being broken away to permit view of an enclosed element.

Fig. 2 is a perspective view of an electric typewriter and of another embodiment of this invention positioned to operate in conjunction therewith.

Fig. 3 is a perspective view of a switch assembly different from but operatively equivalent to a corresponding portion of Fig. 2.

Fig. 4 is a sectional view taken on line 4—4 of Fig. 2.

Fig. 5 is the same as Fig. 4 except for the substitution of a "wiping contact" switch for the switch throwing arms of Figs. 2 and 4.

Fig. 6 is a diagram of an electric circuit operatively suitable for the invention.

Fig. 7 is a diagram of another electric circuit operatively suitable for the invention.

Referring in more detail to the drawings:

The numeral 1 designates the top of a desk or table. 2 is an electric typewriter having feet 3 which rest upon the table 1. The typewriter comprises a carriage 4 on which is mounted a cylindrical platen 5 which is adapted to rotate on its axis. The typewriter also comprises the "return" key 6, downward pressure on which results in carriage 4 being moved to the right until inhibited by a suitable stop member which may be set at an appropriate position, and said downward pressure on key 6 also results in platen 5 being turned counter-clockwise as viewed from its left hand end. Said movement of carriage 4 and turning of platen 5 are actuated by electrically powered components comprised in the typewriter. All of the above is well known conventional structure.

7 is a part of a work piece, such as an envelope, which has passed under platen 5 and has emerged upwardly in front thereof, another part of said work piece being invisible because still behind or curved around under platen 5.

The dotted lines 7' indicate a position which the first mentioned part of work piece 7 will reach if it is further advanced by appropriate turning of platen 5.

8 is a solenoid, which is supported by support 9 through the medium of support extension 9a to which solenoid 8 is affixed. 10 is a thrust rod passing through solenoid 8 and operatively connected with and supported by pivot 11

which in turn passes through movable arm 12; one end of said arm 12 being movably mounted on pivot 13 which also passes through support 9. Support 9 has a bottom bracket 14 which rests on table 1. As one of various convenient and practicable methods of maintaining desired spacial relationship between typewriter 2 and arm 12, one of the feet 3 of typewriter 2 may rest on said bottom bracket 14. It is to be noted that the end of arm 12 which is remote from pivot 13 is positioned immediately over and rests upon key 6.

At the left of typewriter 2 and substantially farther back than carriage 4 and platen 5 is a light source 15 comprising an electric lamp enclosed in an external shield having an opening for the egress of light in a desired direction. Said light source 15 is mounted on left column 16, which has a bottom bracket 17 on which a foot 3 of typewriter 2 stands.

At the right of typewriter 2 and substantially farther toward its front than carriage 4 and platen 5 is an assembly comprising a photoelectric cell 18 enclosed in a hood 19, said hood being shown as partly broken away so as to show said photoelectric cell. Hood 19 has an opening 20 for admitting light from light source 15 to photoelectric cell 18. Said assembly is mounted on right column 21, which has a bottom bracket (not shown) on which may rest a foot 3 of typewriter 2. If desired, the bottom bracket 17 of left column 16 may be integral with the bottom bracket of right column 21 so that the distance between said columns may readily be set and maintained with uniformity.

Broken lines 22 indicate the path of a beam of light from light source 15 to photoelectric cell 18.

The positions and space relationships of all items shown are so arranged that light beam 22 passes above platen 5 at an angle to the axis thereof, and likewise passes over the part of work piece 7 shown, at an angle to the plane thereof. It is to be noted, however, that if and when said part of the work piece advances to the position indicated by lines 7' it will cut across and intercept light beam 22, so that light beam 22 will not then reach photoelectric cell 18.

It is to be understood that the electrical elements shown, such as solenoid 8, light source 15 and photoelectric cell 18 are provided with appropriate electrical conductors through which they may be activated, and furthermore that photoelectric cell 18 is operatively connected with conventional electronic and electrical switch throwing means which is not shown and which may be located behind typewriter 2 or under the top of the desk or table on which the typewriter is supported or in any conveniently available space. Such conventional electronic and electrical switch throwing means is commonly known as a photoelectric relay, and customarily comprises two sets of therminals, there being two terminals in each set. These two sets of terminals each may have one but not both of their respective terminals in common with the other set. The photoelectric relay is adapted alternatively to close a circuit between the two individual terminals of either set, always concurrently breaking all electrical connection between the two individual terminals of the other set; the selection of which set shall be connected and which set disconnected depending upon the incidence or absence of sufficient light striking a photoelectric cell associated with said photoelectric relay.

In the alternative structure shown in Fig. 2, which is operatively equivalent to the above, no photoelectric cell is employed. A left standard 23 is provided, being so positioned that the upper portion thereof is in line with the axis of platen 5 and extends substantially higher than said platen. A similar right standard is provided, 24, likewise positioned in line with the axis of platen 5 and extending substantially higher than said platen. Left standard 23 has a bottom bracket 25, and right standard 24 has a bottom bracket 26, each of said brackets being adapted to have a foot 3 of typewriter 2 stand upon it

for the purpose of maintaining said standards in desired space relationship to said platen. A horizontal shaft 27 is journaled through suitable apertures in the upper part of standards 23 and 24, which apertures are so located that shaft 27 is substantially parallel to the axis of platen 5 at a level above the upper part of said platen.

Mounted on said shaft 27 in such manner as to turn therewith is a switch arm 28 which is shown as suitably formed of sheet material, although a rod or group of rods would serve. Switch arm 28 is preferably positioned a little to the right of the middle of the body structure of typewriter 2, corresponding approximately to the right-and-left position of a work piece being advanced from around platen 5 when carriage 4 has been moved to the right. Switch arm 28 may be slidably mounted on shaft 27 to facilitate right-and-left positioning thereon, so long as it so grips said shaft as to turn the shaft when the switch arm is moved through an arc around the axis of said shaft.

It is to be noted that the space relationships and arrangement are such that the work piece 7 does not make contact with switch arm 28 when the work piece is in the position indicated by solid lines 7, but that when the work piece advances to position 7' (dotted lines) it makes contact with switch arm 28 at a line where said switch arm extends over the upper edge of the work piece, and as the work piece advances further it pushes the switch arm aside, causing the switch arm to move in a small arc around shaft 27, turning shaft 27 with it.

A plate 29 is mounted on right standard 24. Shaft 27 passes through an aperture in plate 29 which coincides with the aperture in right standard 24, so that the end of shaft 27 is shown extending to the right.

On a part of shaft 27 which extends through plate 29 an annular member 30 is so mounted and affixed that it turns with shaft 27, and said member 30 has an arm 31 extending in a plane substantially parallel to plate 29. Blocks 32 and 33, suitably spaced away from each other and located on opposite sides of arm 31, are rigidly attached to plate 29, and passing through threaded apertures in blocks 32 and 33 respectively are screws 34 and 35, their adjacent ends being in line with arm 31. The arc through which arm 31, and consequently shaft 27 and switch arm 28 may rotate, is limited by positioning the said screws by turning them in their respectively associated blocks, so that the limits of said arc may be adjusted and fixed with operative exactness.

Rigidly mounted on annular member 30 so as to rotate therewith around the axis of shaft 27 is a cradle element 36 which, in the form shown in Fig. 2, is adapted to hold a conventional mercury switch 37, which is a sealed glass tube containing a small amount of mercury 37*a* and having a pair of metallic electrical terminals extending through the glass into the interior of said tube, where they become electrically connected when but only when the tube is in such position that the contained mercury flows to and around said pair of terminals; the outside ends of said terminals extending outside of said tube and being available for connection with the conductors of an electric current. Such mercury switches have been well known and in commercial use for many years, and are available with either one or more pairs of the terminals described. If two pairs of terminals are comprised in such a mercury switch, they may be located adjacent opposite ends of the tube, so that the mercury will leave the pair which is instantly higher and run down to the pair that is instantly lower, both pairs being located along substantially the same longitudinal lines of the tube, i.e., on the side which is lowest during operative employment of the tube. Various specific arrangements of terminals, operative to the desired effect, are commercially available.

In Fig. 2 two pairs of terminals are shown, being designated respectively as 38*a* and 38*b*.

The entire assembly of parts which turn on the axis

of shaft 27, comprising the shaft itself, switch arm 28, annular member 30, arm 31, cradle element 36 and mercury switch 37, is so balanced that the center of gravity of said assembly is slightly in front (i.e., on the observer's side in Fig. 2) of the axis of shaft 27, so that turning of the switch arm 28 forward is prevented only by the fact that arm 31 rests against screw 35; the front (i.e., toward the observer) end of mercury switch 37 being slightly lower than the end thereof which is more remote from the observer.

It will be evident that when the part of the work piece shown at 7 moves up to position 7', thereby rubbing against and pushing switch arm 28 and causing it to turn shaft 27, then mercury switch 37 will also be turned through a small arc, which turning will cause the longitudinal inclination of said mercury switch 37 to be reversed so that the mercury in said mercury switch will (under the influence of gravity) run to the opposite end of the tube of said switch, thereby opening or closing an electric circuit, or opening one electric circuit and closing another, according to the arrangement of terminal 38*a* and 38*b* in said mercury switch 37 and the external connections therewith. When, however, the pressure of work piece 7' against switch arm 28 ceases, due to removal of the work piece from the typewriter, the above enumerated assembly of parts which turns with shaft 27 will be returned by gravity to its initial position.

It is obvious, of course, that shaft 27 could be disposed in front of instead of over platen 5, all associated structure being accordingly disposed and rearranged and the curvature of switch arm 28 being reversed, and equivalent operative results could thus be obtained.

Obviously other types of switches could be substituted for mercury switch 37. For example, Fig. 3 shows annular member 30 with an insulating material platform 39 mounted thereon in place of cradle element 36. Platform 39 has, mounted adjacent its respectively opposite ends and on the upper side thereof, metallic conductors 40. A mounting block 41 is affixed to plate 29, and a strip of insulating material 42 is attached thereto, there being near each end of said strip 42 and mounted thereon a pair of electrical terminals, those at one end of the strip being designated as 43*a* and those at the other end 43*b*. The height and inclination of strip 42 relative to platform 39 may be adjusted and fixed by means of a wide-headed set screw 44 by which block 41 is affixed to plate 29, said set screw passing through block 41 and through an appropriately vertically elongated slot in plate 29 and into a threaded nut back of plate 29. Turning shaft 27 turns platform 39 with the result that one or the other of metallic conductors 40 makes contact with both of a pair of terminals (either 43*a* or 43*b*), thereby producing the same operative electrical result as turning similarly the mercury switch 37 of Fig. 2.

The operation of switch arm 28 is shown in Fig. 4. Guide plate 46 of the typewriter is adapted to guide work piece 7 between platen 5 and free-turning roller 47 which bears resiliently against platen 5 in such manner as to grip the work piece against platen 5 so that, as platen 5 revolves (clockwise in Fig. 4) the work piece is carried around under the platen, being flexed by guide 48 until it is again pressed against the platen by smaller free-turning roller 49 and then passes between the platen and the small guide 50, beyond which the work piece advances in a generally upward direction. All of this is conventional typewriter construction. We have omitted from this drawing the commonly provided supplementary guide rollers located higher than the axis of the platen and substantially farther back than the front-most line of the surface of the platen, because these parts are not involved in the operation of this invention, do not operate unless manually manipulated, and are so positioned as not to impede or deflect the advance of work piece 7 in its upward directional movement above set forth. Fig. 4 shows shaft 27 and switch arm 28, the latter being shown in solid lines in its initial position and in broken lines representing its position when pushed aside by the advance of the work piece in the latter's position 7'.

Switch arm 28 is unnecessary when the "wiping contact" switch shown in Fig. 5 is employed. In this Fig. 5 an upper support bar 51 is shown horizontally disposed, and it has a foot 52 which is mounted on left standard 23. Affixed to one side of upper support bar 51 is a piece of insulating material 51*a*, and mounted thereon is a front electrical contact arm 53, which is a curved strip of metal in which is disposed near its upper end a binding screw 54 for the purpose of connecting an electrical conductor wire 55.

56 is a lower support bar, horizontally disposed, which has a foot 57 which is mounted on left standard 23. Affixed to one side of lower support bar is a piece of insulating material 56*a*, and mounted thereon is a back electrical contact arm 58, preferably made of very light spring wire or very light spring metal strip, curved as shown, adjacent and attached to the upper portion of which is a small mass of solder 59 which connects arm 58 with electrical conductor wire 60.

Front electrical contact arm 53 and back electrical contact arm 58 are so disposed that they touch lightly and make electrical contact with each other if no object comes between them at the normally touching parts of their respective convex surfaces.

Work piece 7, in advancing upwardly, encounters (instead of the switch arm of Figs. 2 and 4) the two electrical contact arms 53 and 58, which are so disposed and (one or both of them) so resiliently yielding that the work piece readily pushes its way between them, thereby insulating them from each other and breaking any electrical circuit in which they may be comprised.

Said electrical contact arms 53 and 58 are disposed at such a distance above the front (in Fig. 5 the left side is the front) of platen 5 that the breaking of electrical contact between contact arms 53 and 58 will result from the same amount of upward movement of work piece 7 that would cause the tilting of the switch arm 28 in Fig. 4, or the intercepting of the light beam in Fig. 1.

Various operative equivalents of the switches and switch throwing structures shown are obviously possible. Also various electro-mechanical equivalents might be substituted for the solenoid and thrust rod combination.

The electric circuit diagrams of Figs. 6 and 7 show a transformer 61, adapted to reduce line current to current of suitable voltage available through poles 62 and 63. Also shown is a manual control switch 64, which may be provided for the purpose of throwing the line current on or off with respect to the apparatus as a whole.

The rectangle 65 represents switch throwing means having terminals 66, 67, 68 and 69, so disposed that terminals 66 and 67 constitute a set or pair, and terminals 68 and 69 constitute another set or pair. Each pair may have one but only one of its terminals electrically connected with or identical with one but only one terminal of the other pair.

Switch throwing means 65 is to be identified with the light beam, photoelectric cell and photoelectric relay combination of Fig. 1, or with the switch arm and mercury switch combination of Fig. 2, or with the switch arm of Fig. 2 in combination with the mechanical switch of Fig. 3, or with the "wiping contact" switch of Fig. 5, or any equivalent.

Switch throwing means 65 may comprise a single pole, or a double pole single throw, or a double pole double throw switch, according to the requirements of the circuit employed and the type of switch appropriate thereto. For example, the light beam, photoelectric cell and photoelectric relay combination described in connection with Fig. 1 would, in effect, comprise a double pole double

throw switch. The same may be said of the switch arm and mercury switch combination of Fig. 2 and of a combination of the switch arm of Fig. 2 with the mechanical switch of Fig. 3. Of course, any of these could also function as a double pole single throw switch if one of the two pairs of terminals shown were absent or were not connected into any electric circuit. The "wiping contact" switch of Fig. 5 would function in effect as a single pole switch, the equivalent of terminals **68** and **69** being absent.

For the purpose of the electric circuit shown in Fig. 6, terminals **68** and **69** are not utilized and may be absent, or if present would not be connected into any circuit.

For the purpose of the circuit shown in Fig. 7 all terminals shown, or their operative equivalent, are required. If all are to be utilized the switch throwing means **65** must be adapted to close a circuit between one pair of terminals and to break a circuit between the other pair of terminals simultaneously, so that at any given time current may pass between one but only one pair of terminals, the selection being an operative consequence of the presence or absence of a work piece in a specific space relationship to the platen of an electric typewriter as set forth and illustrated in connection with the preceding figures.

In the following discussion it is assumed that the manual control switch **64** is closed, so that current of suitable voltage is available through transformer **61**.

Fig. 6 shows a circuit running from pole **62** of transformer **61** to solenoid **70** and thence to terminal **66**, continuing from terminal **67** to pole **63**. If the circuit is closed by switch throwing means **65** between terminals **66** and **67**, solenoid **70** will be energized, whereas if the circuit is broken between terminals **66** and **67**, then solenoid **70** will not be energized.

Solenoid **70** is to be identified with solenoid **8** of the views shown in Figs. 1 and 2.

Fig. 7 shows all the elements of Fig. 6 and in addition thereto shows the following: primary relay switch **71** which may be closed by energizing coil **72** and opened by energizing coil **73**; secondary relay switch **74** which may be closed by energizing coil **75** and opened by energizing coil **76**; both relay switches (**71** and **74**) being adapted to remain in closed or open position, whichever has resulted from the more recent energizing of either of its related coils. We find it convenient to accomplish this by employing what are commercially known as "latching relays." It is of course obvious that differential relays could be substituted as operative equivalents of the relay provisions shown.

The circuits of Fig. 7 are:

(1) A primary operating circuit running from pole **62** through primary relay switch **71** to solenoid **70**, and thence to pole **63**.

(2) A secondary operating circuit running from pole **62** through secondary relay switch **74** to solenoid **70** and thence to pole **63**.

(3) A primary control circuit running from pole **62** to coil **76**, thence to coil **72**, thence to terminal **66**, and from terminal **67** to pole **63**.

(4) A secondary control circuit running from pole **62** to coil **73**, thence to terminal **68**, and from terminal **69** to pole **63**.

(5) A re-starting circuit running from pole **62** to coil **75**, thence to push button two point make switch **77**, and thence to pole **63**.

If primary relay switch **71** is closed, then solenoid **70** will be energized by the primary operating circuit; whereas if primary relay switch **71** is open solenoid **70** will not be energized by the primary operating circuit.

Similarly, if secondary relay switch **74** is closed, then solenoid **70** will be energized by the secondary operating circuit, whereas if secondary relay switch **74** is open solenoid **70** will not be energized by the secondary operating circuit.

Whether relay switches **71** and **74** will be open or closed at any given time will depend on the status of the primary and secondary control circuits, which are coordinated by their mutual dependence on switch throwing means **65**, which is adapted when in one of two possible situations to close a circuit between terminals **66** and **67** and concurrently to break the circuit between terminals **68** and **69**; said switch throwing means **65** being adapted, conversely, when in the other of its two possible situations, to break the circuit between terminals **66** and **67** and concurrently to close a circuit between terminals **68** and **69**.

If the circuit between terminals **66** and **67** is closed, and the circuit between terminals **68** and **69** broken, the primary control circuit will be energized, with the result that coil **72** will close primary relay switch **71** and coil **76** will open secondary relay switch **74**. Consequently the primary operating circuit will be energized and the secondary operating circuit will be de-energized, and solenoid **70** will be energized by the primary operating circuit.

If, following the above situation, the circuit between terminals **66** and **67** is broken and the circuit between terminals **68** and **69** is closed, then the primary control circuit will be de-energized, with the concurrent energizing of the secondary control circuit, whereupon coil **73** will open primary relay switch **71**. Secondary relay switch having previously been opened, will remain open since the secondary control circuit comprises no means of closing it. Accordingly, solenoid **70** will not be energized by either the primary or the secondary operating circuit.

If in this situation the push button two point make switch **77** is closed, even momentarily, the re-starting circuit will be energized and coil **75** will close secondary relay switch **74**, with the result that the secondary operating circuit will be energized and will energize solenoid **70**, and this condition will so remain until the situation of the switch throwing means **65** is reversed (thereby closing the circuit between terminals **66** and **67** and breaking the circuit between terminals **68** and **69**) whereupon the operating condition will revert to that described in the second preceding paragraph, control being taken over by the primary control circuit which will cause the primary operating circuit to be energized and the secondary operating circuit to be de-energized.

The location of switch **77** is not shown in Figs. 1 and 2 because its presence or absence is dependent upon the type of circuit chosen and employed. In practice it is more likely to be used when the typewriter is operated by mechanical or so called "automatic" means. In any case its precise location would be determined by convenience of access, particularly access to mechanical connection with automatic typewriting mechanism if such is used.

To recapitulate:

The described combinations of structural and electrical provisions, disposed as set forth, provide means for controlling the rotation of the platen of an electric typewriter so that a work piece appropriately introduced into the typewriter will be brought to and stopped at a specific desired position, particularly a position suitable for imprinting the first line of indicia thereon.

A unique and important aspect of this invention is that it positions a work piece which is passing through an entirely distinct and separate mechanism, with the normal operation of which it in no way interferes.

It solves the problem of automatically positioning paper objects in a standard commercial typewriter, subsequent to their having been introduced into said typewriter with only fortuitous time relationship to any instant position of any part of the mechanism comprised therein—and this in spite of the operative restriction that the work piece must encounter no resistance, or only negligible resistance, as it progresses, unsupported, tangentially away

from the typewriter platen in response to the rotation thereof.

In the species shown in Fig. 1 the work piece encounters no resistance whatsoever. It merely intercepts a light beam when it reaches the desired position, which results in its stopping in that position. Its further movement is unobstructed, but will occur only as a result of subsequent manipulation or operation of the typewriter independent of the functioning of this invention.

In the species shown in Figs. 2, 3, 4 and 5 the work piece encounters only negligible resistance and stops as described on reaching the desired position, there being no obstruction to its further movement independent of this invention.

As has been pointed out, the platen turning mechanism of a conventional electric typewriter is responsive to pressure and release of pressure upon the return key of said typewriter, which key this invention operates by means comprising a solenoid or operative equivalent thereof (8 in Figs. 1 and 2, identical with 70 in the electrical diagrams of Figs. 6 and 7), the functioning of which solenoid is determined and controlled by switch throwing means which is selectively and differently responsive to the presence and absence of a work piece in a desired position.

In the absence of a work piece from the desired position, the solenoid is energized, with the result that the return key of the typewriter is pressed down and held down. This results in the platen being rotated by electrically actuated mechanism conventionally comprised in the typewriter.

When a work piece is introduced into the typewriter (either manually or mechanically) under these circumstances, the work piece is carried around under the platen and emerges advancing upwardly in front of the platen. When it has so advanced to a predetermined space relationship to components of this inventive apparatus which are sensitive to its arrival and presence, the energization of the solenoid is automatically stopped, the downward pressure on the return key is stopped, the rotation of the platen is stopped, and the movement of the work piece is consequently and concurrently stopped. But since further upward movement or right and left movement of the work piece, while held in the typewriter, do not remove it from the region in which the present invention is sensitive to its presence, and consequently quiescent, normal operation of the typewriter may proceed.

The inventive apparatus is, however, reactivated and in readiness for the next succeeding work piece immediately upon removal of any given work piece from the typewriter, which may be accomplished in the normal manner by the typewriter operator, whether personal or mechanical.

The basic circuit shown in Fig. 6 is, in operative effect, present in modified form in the circuit arrangement of Fig. 7 or equivalents or variations thereof. In species which employ the circuit of Fig. 7, which comprises switch 77, the typewriter operator (personal or mechanical) has the option of reactivating the inventive mechanism at any time by pushing said switch 77, whereupon the mechanism will automatically cause the typewriter to eject the work piece, and will be in operative readiness for the next succeeding work piece.

We claim:

1. For use in combination with an electrically actuated typewriter having a rotatable platen and having a return key, substantial pressure upon which results in said platen being rotated by mechanism also comprised in said typewriter, apparatus comprising: key operating means comprising a member capable of being electrically energized and de-energized and adapted to respond to electrical energization and de-energization by movements in respectively opposite directions, said key operating means being adapted to transmit one of said movements to said return key in the form of substantial pressure thereon and to transmit the other of said movements thereto in the form of cessation of such pressure; an electric switch; a photoelectric relay comprising a photocell, said photoelectric relay being adapted to put said switch in the state of being closed and to put said switch in the state of being open in desired selective response to the incidence and non-incidence of light rays of suitable character and intensity on said photocell; lighting means adapted to produce light rays of said suitable character and intensity and so located and arranged as to be adapted to project said rays, at a predetermined specific height above said platen, transversely through a plane in which each of a series of separate rectangular work pieces individually held in turn in said typewriter severally advances substantially tangentially away from said platen after having passed around said platen, and said photocell being so disposed as to receive incidence of said rays after they have passed through said plane at said height, so that when any such work piece so advances to said predetermined specific height above said platen said rays are intercepted by such work piece and incidence of said rays on said photocell does not occur during the time that any part of such work piece occupies said plane at said height and the state of said switch is resultantly automatically reversed, and when subsequently such work piece passes entirely out of said height of said plane the incidence of said rays on said photocell is resumed and the state of said switch is resultantly automatically made the same that it was before said rays were intercepted by such work piece; and circuit conductor means electrically connected with said switch and adapted to be connected with a source of electric power, and, when connected with the latter, to effect de-energization and energization of said member comprised in said key operating means in response respectively to the open and closed states of said switch; said apparatus and its respective components being locatable in such space relationship to said typewriter that the said key operating means can press upon and cease pressing upon said return key and that the said predetermined specific height above said platen can be at a desired level.

2. For use in combination with a typewriter comprising a rotatable platen and electrically actuated means for rotating said platen, apparatus for so governing the rotation of said platen as to cause rotation thereof in anticipation of the introduction of a work piece into said typewriter, and also to cause said platen to bring into predetermined space relationship to said typewriter, and to stop in such relationship, each of a series of separate work pieces severally introduced into said typewriter, said apparatus comprising: contacting means adapted to be placed in contact with said typewriter and to be electrically energized and de-energized, and, while energized, to bring into and maintain in action the platen rotating means comprised in said typewriter; an electric switch; a photoelectric cell located on one side of a plane in which each of a series of separate work pieces individually held in said typewriter in turn severally advances substantially tangentially away from said platen after having passed around said platen; lighting means adapted to produce rays of light and so located and disposed as to be adapted to project said rays to said photoelectric cell in a path passing transversely through said plane at a predetermined specific level substantially above said platen; a photoelectric relay operatively associated with said photoelectric cell, said relay being adapted to close and to open said switch in desired selective response to the incidence and non-incidence of said rays on said photoelectric cell after said rays have passed transversely through said plane, the spatial disposition of said lighting means and of said photoelectric cell being such that when a work piece such as described advances as described to sail level such work piece prevents passage of said rays through said plane and resultantly prevents incidence of said rays on said photoelectric cell during the time that any part of such work piece is at said level in said plane; and circuit conductor means adapted to be connected with a source

of electric power, said circuit conductor means being electrically connected with said switch and with said contacting means and being adapted to effect energization and de-energization of said contacting means in consistently related response to the closing and opening of said switch; said apparatus and its respective components being locatable in such space relationship to said typewriter that said contacting means can cause the platen rotating means comprised in said typewriter to function and to cease functioning, and that the said predetermined specific level can be at a desired distance above said platen.

3. Apparatus for so governing the rotation of a cylindrical platen which platen is comprised in an electrically actuated typewriter having a return key, movement of which results in said platen being rotated by mechanism also comprised in said typewriter, by timed movement of said return key, as to cause rotation of said platen in anticipation of introduction of a work piece into said typewriter, to bring into a predetermined desired space relationship relative to said typewriter, and to stop in such space relationship, a work piece introduced into said typewriter, said apparatus comprising: a solenoid having a thrust bar responsive by longitudinal movement to electrical energization of said solenoid and adapted to retract said movement when said solenoid is de-energized; means for transmitting a longitudinal movement of said thrust bar to said return key of said typewriter; a photoelectric cell located on one side of a plane in which a work piece held in said typewriter advances after passing around said platen; a light source located on the other side of said plane and adapted to project a light beam transversely through said plane to said photoelectric cell; a photoelectric relay operatively associated with said photoelectric cell and having a pair of terminals, said photoelectric relay being capable of being in two different stable states and of changing back and forth between said states in response, respectively to incidence and lack of incidence of said light beam on said photoelectric cell from said other side of said plane; one of said states being such as to result in making operative electrical connection between said terminals and the other of said states being such as to result in breaking operative electrical connection between said terminals; and circuit conductor means electrically connected with said terminals and adapted to be connected with a source of electric power, and, when so connected with said source of electric power, being adapted to effect energization and de-energization of said solenoid in response, respectively, to the making and breaking of operative electrical connection between said terminals.

4. For use in combination with a typewriter comprising a rotatable platen and electrically actuated means for rotating said platen, apparatus for so governing the rotation of said platen as to cause it to rotate in anticipation of the introduction of a work piece into said typewriter, and also to cause said platen to bring into predetermined space relationship to said typewriter, and to stop in such relationship, each of a series of separate work pieces severally introduced into said typewriter, said apparatus comprising: contacting means adapted to be placed in operative contact with said typewriter and to be electrically energized and de-energized, and, while energized, to bring into and maintain in action the platen rotating means comprised in said typewriter; an electric switch adapted to be closed and to be open; in operative combination with said switch an arm extending into space substantially above said platen, said arm having, at a predetermined specific height above said platen, an upper portion disposed, when said arm is in normal position, transversely through a plane in which each of a series of separate work pieces individually held in turn in said typewriter severally advances substantially tangentially away from said platen after passing around said platen, said upper portion being adapted to be displaced, with resultant movement of said arm, from said plane by a work piece such as those described when such work piece advances in said plane to said predetermined specific height above said platen, and said arm being adapted to move back automatically to its normal position when such work piece leaves said height in said plane, the said switch being adapted to be closed and to be opened by said movements of said arm; and circuit conductor means adapted to be connected with a source of electric power, said circuit conductor means being connected with said contacting means and with said electric switch and adapted to effect energization and de-energization of said contacting means in consistently related response to the closing and opening of said switch; said apparatus and its respective components being locatable in such space relationship to said typewriter that the said contacting means can cause the platen rotating means comprised in said typewriter to function and to cease to function and that the said predetermined specific height can be at a desired distance above said platen.

5. For use in combination with a typewriter comprising a rotatable platen and electrically actuated means for rotating said platen, apparatus for automatically so governing the rotation of said platen as to cause it to revolve in anticipation of the introduction of a work piece into said typewriter, and also to cause said platen to bring into predetermined space relationship to said typewriter, and to stop in such relationship, each of a series of separate work pieces severally introduced into said typewriter, said apparatus comprising: contacting means adapted to be placed in operative contact with said typewriter and to be electrically energized and de-energized, and, while energized, to bring into and maintain in action the platen rotating means comprised in said typewriter; electrical conductor means electrically connected with said contacting means and adapted to be connected with a source of electric power; an electric switch adapted to be opened and to be closed and so connected with said conductor means that when said conductor means is connected with a source of electric power and said switch is closed said contacting means will be energized; a movable arm adapted to be in a natural position and in a displaced position and to move back and forth from either of said positions to the other, said arm having a portion thereof which, when said arm is in said natural position, juts through, at a predetermined level substantially above said platen, a plane in which each of a series of separate work pieces individually held in turn in said typewriter severally advances substantially tangentially upwardly away from said platen after passing around said platen, said portion being adapted to be readily displaced and prevented from jutting through said plane, with resultant movement of said arm to said displaced position, by a work piece such as those described when such work piece advances in said plane to said level, and said arm being adapted to move back to said natural position with said portion thereof jutting through said plane when such work piece is removed from said level in said plane; said arm being operatively associated with said switch in such manner that said switch is closed and opened in conformity with the movement and position of said arm; said apparatus and its respective components being locatable in such space relationship to said typewriter that said contacting means can cause the platen rotating means comprised in said typewriter to function and to cease to function and that said predetermined level can be at a desired distance above said platen.

6. Apparatus for so governing the rotation of a cylindrical platen which platen is comprised in an electrically actuated typwriter having a return key movement of which results in said platen being rotated by mechanism also comprised in said typewriter, by timed movement of said return key, as to cause said platen to rotate in anticipation of the introduction of a work piece into said

typewriter, and also to bring a predetermined desired space relationship relative to said typewriter, and to stop in such relationship, a work piece introduced into said typewriter, said apparatus comprising: a solenoid having a thrust bar responsive by longitudinal movement to electrical energization of said solenoid and adapted to retract said movement when said solenoid is de-energized; means for transmitting longitudinal movement of said thrust bar to the said return key of said typewriter; a photoelectric cell located on one side of a plane in which a work piece held in said typewriter advances after passing around the platen thereof; a light source located on the other side of said plane and adapted to project a beam of light transversely through said plane upon said photoelectric cell; a photoelectric relay comprising said photoelectric cell and a first switch which said photoelectric relay is adapted to close when said light beam is projected upon said photoelectric cell, and comprising also a second switch which said photoelectric relay is adapted to close when said light beam is cut off from said photoelectric cell; said photoelectric relay being adapted to keep one or the other but not both of said switches closed at any given time; a primary operating circuit comprising said solenoid and also comprising a primary relay switch which has and is adapted to be controlled by two coils which are not electrically connected with said primary operating circuit, one of said coils being adapted, when energized, to close said primary relay switch, and the other of said coils being adapted, when energized, to open said primary relay switch; said primary relay switch being adapted to remain in the position resulting from the most recent energizing of either of said coils until the other of said coils is energized; a secondary operating circuit comprising said solenoid and also comprising a secondary relay switch which has and is adapted to be controlled by two coils which are not electrically connected with said secondary operating circuit, one of said coils being adapted, when energized, to close said secondary relay switch, and the other of said coils being adapted, when energized, to open said secondary relay switch; said secondary relay switch being adapted to remain in the position resulting from the most recent energizing of either of said coils until the other of said coils is energized; a primary control circuit electrically connected with said first switch of said photoelectric relay and also electrically connected with that coil which is adapted to close the primary relay switch comprised in said primary operating circuit, thereby causing said primary operating circuit to be energized; said primary control circuit also being electrically connected with that coil which is adapted to open the secondary relay switch comprised in said secondary operating circuit, thereby causing said secondary operating circuit to be de-energized; a secondary control circuit electrically connected with said second switch of said photoelectric relay and also electrically connected with that coil which is adapted to open the primary relay switch comprised in said primary operating circuit, thereby causing said primary operating circuit to be de-energized; and a re-starting control circuit comprising and electrically connected with a re-starting switch capable of being operated by impulse externally applied, said re-starting control circuit also being electrically connected with that coil which is adapted to close the secondary relay switch comprised in said secondary operating circuit so that when said re-starting switch is closed said secondary operating circuit will be energized; said light source and said photoelectric cell being locatable in such space relationship to said typewriter that when a work piece held in said typewriter has advanced around and above said platen thereof to a specific desired height relative thereto said work piece will come between said light source and said photoelectric cell with the result that said beam of light will be intercepted by said work piece and incidence of said beam of light on said photoelectric cell will be thereby prevented until said work piece is removed from between said light source and said photoelectric cell.

7. For use in combination with a typewriter comprising a rotatable platen and electrically actuated means for rotating said platen, automatic apparatus for so governing the rotation of said platen as to cause it to rotate in anticipation of the introduction of a work piece into said typewriter, and also to cause said platen to bring into predetermined space relationship to said typewriter, and to stop in such relationship, each of a series of separate work pieces severally introduced into said typewriter, said apparatus comprising: contacting means adapted to be placed in operative contact with said typewriter and to be electrically energized and de-energized and, while energized, to bring into and maintain in action the platen rotating mechanism comprised in said typewriter; switch throwing means having a projection extending toward a plane in which each of a series of separate work pieces severally introduced into said typewriter is advanced by the platen thereof when rotating, said projection being adapted to extend transversely through said plane when unobstructed by such a work piece and to be obstructed by such a work piece and thereby prevented from extending through said plane when said work piece has been so far advanced by said platen as to occupy a specific area of said plane through which said projection would otherwise extend, said work piece continuing to prevent said projection from extending through said plane until said work piece is entirely removed from said specific area of said plane, and said projection being adapted thereupon to resume its extending through said plane; an electric switch operatively associated with said switch throwing means and adapted to be opened and to be closed thereby in selective response to the extension and non-extension respectively of said projection through said plane; and electric current conducting means adapted to be connected with a source of electric power and also connected with said electric switch and said contacting means in such manner that said contacting means is energized when said switch is closed and de-energized when said switch is open; said apparatus and its respective components being locatable in such space relationship to said typewriter that said contacting means can cause the platen rotating means comprised in said typewriter to function and to cease to function and that said specific area of said plane can be arranged to be at a desired distance from said platen.

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