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TABULATING DEVICE

Filed July 2, 1957 3 Sheets-Sheet 1

FIG. 1

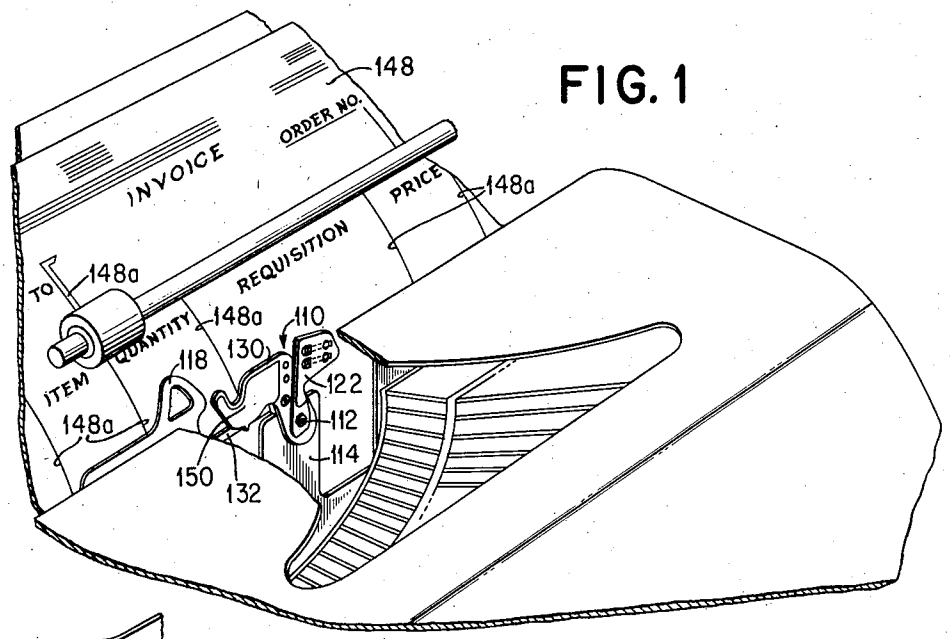
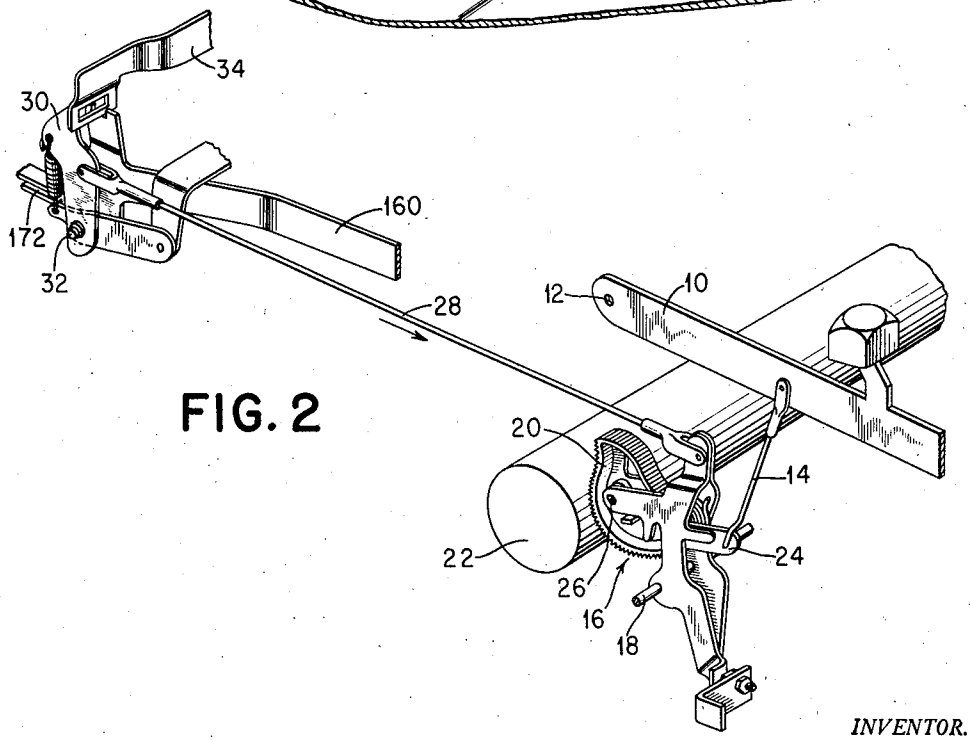


FIG. 2



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TABULATING DEVICE

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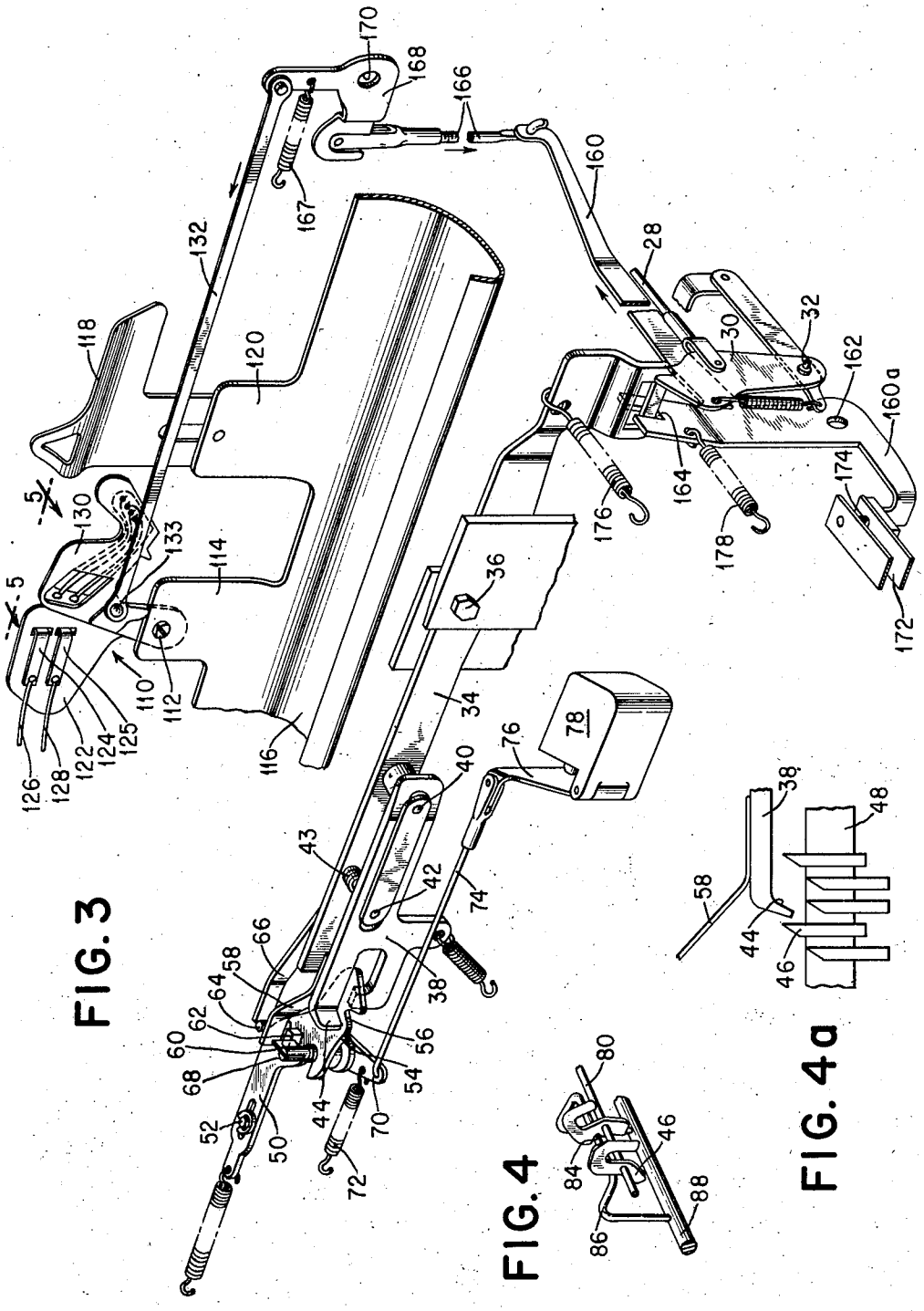

FIG. 3

FIG. 4a

FIG. 4

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TABULATING DEVICE

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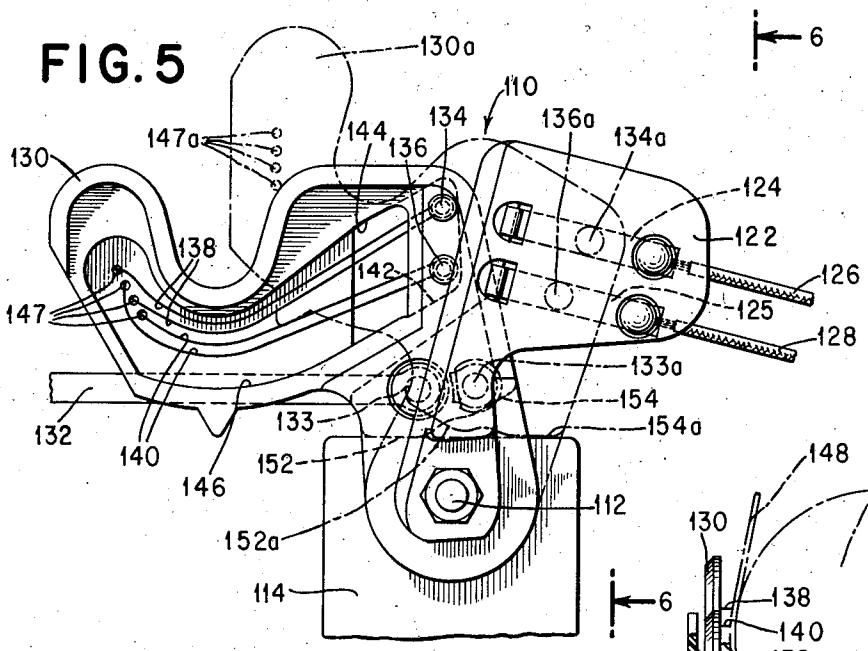
FIG. 5



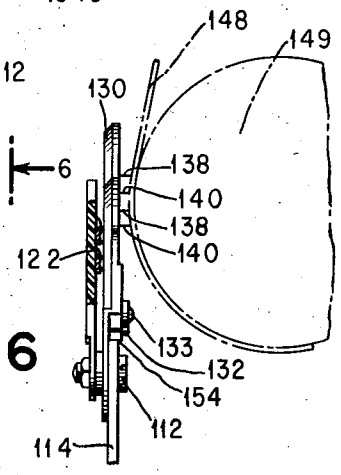
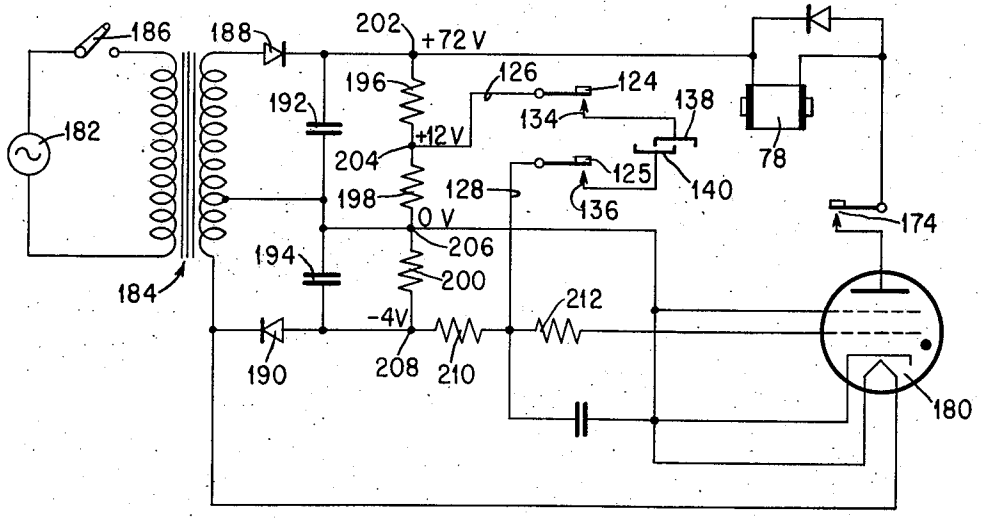


FIG. 6

FIG. 7



United States Patent Office

2,902,137

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2,902,137

TABULATING DEVICE

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Application July 2, 1957, Serial No. 669,537

7 Claims. (Cl. 197—177)

This invention relates to a tabulating device for typewriters and like machines and more particularly to an automatic tabulating device.

Tabulating devices are generally of two types, the first type having the tab (tabulating) stops preset by the operator for stopping the carriage in a predetermined location whereas the second type does not require presetting of the stops but, in response to the sensing of indicia, for example, on the form being typed, a tab stop is set and then operates to stop the carriage according to the position of the sensed indicia. A third variation is one where equally spaced tab stops are preset and, after a tab movement of the carriage is initiated, indicia associated with the moving carriage are sensed to actuate a tab check lever to engage the tab stop then adjacent the tab check lever.

The present device is of the third class described above, and includes the preset stops, indicia to be sensed on the typing form carried by the carriage, a sensing finger movable to a sensing position for sensing the indicia and circuit means operable in response to the sensing of indicia for actuating a tab check lever for engagement with one of the preset tab stops for positioning the carriage in accordance with the location of the indicia sensed.

The principal object of this invention is to provide an improved tabulating device.

A further object of this invention is to provide an improved electronic tabulating device.

Another object of this invention is to provide a tabulating device operable with equally spaced tab stops.

Yet another object of this invention is to provide an improved tabulating device operable in response to indicia on the carriage or on a form carried by the carriage.

Another object of this invention is to provide a tabulating device having a sensing finger which is movable to a rest position when not actually sensing for carriage positioning indicia whereby an unobstructed view of the print line is obtained.

Still another object of this invention is to provide a tabulating device having a sensing finger normally out of contact with the platen to facilitate insertion of forms and movable to an operative position for sensing the forms.

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

In the drawings:

Fig. 1 is a fragmentary perspective view of a typewriter showing the location and the rest position of a sensing device.

Fig. 2 is a partial perspective view of the tab actuating mechanism of a typewriter.

Fig. 3 is a partial perspective view from the left rear corner of a typewriter showing the tabulating device.

Fig. 4 is a partial showing of a tab rack illustrating a method of setting predetermined tab stops.

Fig. 4*a* is a fragmentary view of a tab rack and tab check lever.

Fig. 5 is a partial view taken along the line 5—5 in Fig. 3.

Fig. 6 is a section taken along the line 6—6 in Fig. 5.

Fig. 7 is a wiring schematic of the circuits controlled by the electronic tab drive.

This device is shown and described herein as adapted for controlling the tabulating (tab) mechanism of a typewriter of the type illustrated in the copending application, Serial Number 555,529 filed December 27, 1955 on behalf of Thurston H. Toeppen, now Patent No. 2,818,961.

The device described therein is an electrically controlled stop for a tabulating mechanism wherein the carriage is released for tabulation flight by conventional mechanism but is stopped in response to a signal generated by sensing a conductive mark on the page being printed. The generated signal triggers a magnet which acts through linkages to effect the usual stopping of the carriage.

Referring to Fig. 2, a key lever **10** is pivotally supported at a point **12** for rocking action into and out of an actuating position. The key lever **10** is connected via a link **14** to a cam assembly **16** which in turn, is pivotally supported at a fulcrum **18**. The cam assembly is provided with a cam **20** which is selectively engageable with a continuously rotating power roll **22**. More specifically, the link **14** rocks a trip lever **24** about a fulcrum **26** to release the cam **20** into engagement with the power roll **22** thereby causing the cam to make a half revolution. The half revolution of the cam rocks the cam assembly **16** clockwise about its pivot **18** to exert a pull in the direction of the arrow on a link **28** which is connected to a crank arm **30**. The latter is pivotally supported on the carriage frame by means of a stud **32** and as a result of the pull on link **28**, the upper end of the crank arm **30** acts on a tab lever **34** to pull it forward.

With reference now to Fig. 3, the tab lever **34** is pivotally supported for rocking movement about a stud **36**. The tab lever **34** carries a tab check lever **38** which is pivotally supported at one end by a stud **40** carried by the tab lever **34**, and is urged outwardly, to be basically parallel to the tab lever, by a spring **43** which is supported about a stud **42** carried by the tab lever. The tab check lever **38** is slidable on studs **40** and **42** and further it can be moved clockwise about the stud **40** against the compression of the spring **43**.

In conventional operation, the tab check lever **38** remains parallel to the tab lever **34**, and when the latter is moved to an operative position, a nose **44** on the tab check lever is positioned to engage a set tab stop **46**, Fig. 4*a*, carried by a conventional tab rack **48**. The nose **44** of tab check lever engages a tab stop, thereby stopping the carriage in the desired position.

The tab mechanism is further provided with a rebound check lever **50**, Fig. 3, which is pivotally supported about a stud **52** carried by the carriage frame. The tab check lever **38** in the operative position, Fig. 4*a*, is engageable with a tab stop **46** in a manner wherein an inclined surface **54** of the rebound check lever **50** will first engage one of the stops **46** causing the rebound check lever **50** to be rocked counterclockwise about its stud **52**. After the nose **44** of the check lever engages a tab stop, however, and is moved to the right on the tab lever **34**, a notch **56** of the rebound check lever **52** will snap back over the stop **46** to prevent a rebound of the carriage. Then, when the carriage comes to rest, the rebound lever and tab lever are restored to their normal positions as described in the cited application.

The tab lever **34** is moved to its active position in response to the depression of the tab key lever, **10**, but the tab check lever **38** and the rebound check lever **50** are held out of engagement with the tab stops **46** until

a predetermined signal has been received. The mechanism for accomplishing this result is shown in Fig. 3.

The tab check lever **38** is provided with an integral extension **58** which is engageable with a latch blade **60**. The rebound check lever **50** is equipped with a pin **62** and a pin **64** which are engageable respectively with a lower portion of the latch blade **60** and with a flat spring **66** fixed on the tab lever **34**. The latch blade **60** is pivotally mounted on a pin **68** carried on a lever **70** which is biased clockwise by a spring **72**. If the blade **60** is removed from the path of the extension **58** and the pin **62**, then the tab check lever spring **43** on stud **42** and the tab lever spring **66** will cooperate to push the tab check lever **38** and rebound check lever **50** into the path of the tab stops **46**.

It is apparent then, that the operating principle of this invention hinges upon the timely actuation of the latch blade **60**, which, in turn, is controlled by the following mechanism. It is apparent that any movement of the lever **70** to the right as viewed in Fig. 3, will rock the trip latch **60** counterclockwise (to a tripping position) to disengage it from the pin **62** of the rebound check lever **50** and from the extension **58** of the tab check lever **38**, permitting the two pieces, **38** and **50**, to move into the path of the tab stops **46**.

In order to control the rocking of the lever **70** to the tripping position, a link **74** is interconnected between the lever **70** and an armature **76** of a magnet **78**. Normally, the lever **70** is held to a clockwise limit by means of the spring **72** thereby assuring that the latch blade **60** will be engageable with the associated latch parts of the check lever and rebound check lever.

With the mechanism shown, it is apparent that, upon the energization of magnet **78**, the armature **76** will be attracted to it and, acting via link **74**, will rock lever **70** and thereby remove the latch blade **60** from the path of the rebound check lever pin **62** and the tab check lever extension **58** permitting them to move to their active positions.

It should be mentioned here that prior to using this tab device, every third tab stop **46** on the tab rack **48** is moved to its operative position (see Fig. 4*a*). It then becomes necessary, once a tab run has been started for the tab check lever **38** to be moved only the last fraction of an inch in order to engage a tab stop **46**. It will be understood that other spacings, for example, every second or every fourth tab stop, may be used.

Every third tab stop may conveniently be set up by a device illustrated in Fig. 4. Every third tab stop **46** is the usual type pivoted on a rod **80**. The other tab stops are special and contain a groove **84**. A cam member **86** is mounted on a shaft **88** which is rotatable, for example by depression of a key (not shown). When the cam **86** is actuated and the carriage is moved past the cam, the usual tab stops **46** are rotated, by the cam member **86**, to their set position whereas the grooves in the special tab stops permit them to remain in their unset position.

Referring to Figs. 1, 3 and 5 a sensing device, generally designated **110**, is mounted by a bolt **112** on a finger **114** formed on the usual front rail dust cover **116**. The finger **114** normally mounts a right hand line gauge card holder similar to the left hand line gauge card holder **118** which is mounted on a finger **120** similar to the finger **114**. The sensing device **110** comprises a contact member **122** carrying spring contacts **124** and **125** having conducting leads **126** and **128** respectively. The contact member **122** is rigidly fixed to the finger **114**, whereas a sensing member **130** is pivotally mounted on the same bolt **112**. The member **130** is movable by a sensing member link **132**, pivotally connected by a pin **133**, for movement from the full line position of Fig. 5 to the dotted line positions **130***a*. Hereinafter a suffix *a* designates the active positions of various elements. The sensing finger **130** carries contact buttons **134** and **136**. The button **134** is connected to two wires **138** and the button **136** is connected to two wires **140**. The wires **138** and **140** extend from a recess **142** at the rear side of the member **130** and the contacts **134** and **136**, through an opening **144** to a recess **146** in the front side of the member **130**. The wires **138** and **140** extend approximately one thirty-second (1/32) of an inch through holes **147** in the member **130** to contact a form **148** on the usual typewriter platent **149**, Fig. 6. As shown in Fig. 1, the recess **146** may be covered by a thin cover **150** to conceal and protect the wires **138** and **140**. The member **130** has formed on the rear side thereof a straight flange **152** cooperating with the horizontal top surface of the finger **114** for limiting the rest position of the member **130**, and a straight flange **154** cooperating with horizontal top surface of the finger **114** for limiting the actuated position of the member **130**. The surfaces **152** and **154** are shown in the actuated position of the member **130** and are designated **152***a* and **154***a*. The pin **133**, in the actuated position of the link **132**, is designated **133***a*. Similarly, the contact buttons **134** and **136**, in the actuated position of the member **130**, are designated **134***a* and **136***a*.

Operation

When the key lever **10** is depressed, as described hereinbefore, thereby actuating the cam assembly **16** to exert a pull on the lever **30** through the link **28**, the lever **30** pivots the tab lever **34** causing the lever **34** to pivot an operating lever **160** clockwise about its pivot point **162**. The operating lever **160** is connected with the tab lever **34** by means of a notch **164**. Actuation of the tab lever **34** cocks the tab check lever **38** and the rebound check lever **50** in the manner described hereinbefore. The clockwise motion of the operating lever **160** moves a link **166** downwardly thereby permitting a bell crank spring **167** to pivot a bell crank **168** about a pivot point **170** where the crank is mounted on the machine. Counterclockwise motion of the crank **168** pushes the sensing member link **132** to the left (Fig. 3) and moves the sensing member **130** from the rest position (Figs. 1, 3 and 5) to the actuated position (dotted outline Fig. 5).

As the sensing member **130** swings to the actuated position, the contact buttons **134** and **136** contact the contact springs **124** and **125** and, at the same time, the line of holes **147** with the wires **138** and **140** extending therethrough, assumes the vertical position in Fig. 5 where the holes are designated **147***a*. The wires **138** and **140** make contact with the form **148**, as shown in Fig. 6. Also, as the operating lever **160** pivots clockwise, an extension **160***a* operates a contact blade **172** to close contacts **174** which are mounted on the machine.

When the cycle of the cam assembly **16** is completed, the tab lever **34** and the operating lever **160** are restored to their rest positions by respective springs **176** and **178**.

Forms

The forms to be used in conjunction with this device must be designed to fit into the preset stop sequence. This means that the space between conductive lines **148***a* on the form **148**, Fig. 1, must be equivalent to, or multiples of, the space between the preset tab stops. In the embodiment disclosed herein, the width of this space is three times the pitch of the individual tab stops or any multiple of that figure. The lines **148***a* may be printed with electrically conductive ink or by any other suitable method.

Circuit

Referring to Fig. 7, the circuit operated by the various contacts is illustrated in schematic form and includes the contacts **124**—**134**, **125**—**136** and **174**; the magnet **78**, the sensing wires **138** and **140** and a type 2D21 thyratron designated **180**.

A suitable power supply may include a source of alternating current **182**, a transformer **184**, an On-Off

switch **186**, and suitable rectifying means including diodes **188** and **190**, capacitors **192** and **194** and a voltage divider network including resistors **196**, **198** and **200**. The component values are so arranged as to produce plus 72 volts (+72 v.) at a point **202**; plus 12 volts (+12 v.) at a point **204**; zero volts (0 v.) at a point **206**; and minus 4 volts (—4 v.) at a point **208**.

The thyratron **180** is normally non-conducting. When the tab key lever **10** is depressed, the tab lever **34** is actuated and the tab check lever **38** is latched as described hereinbefore; the operating lever contacts **174** close, completing the anode circuit of the thyratron **180**. The thyratron is prevented from firing at that time due to the minus 4 volt potential at the point **208** which is impressed, through two series connected resistors **210** and **212** on the first grid of the tube. The second grid and the cathode are tied to the zero volt point **206**.

At the same time the contacts **174** are being closed, the sensing member **130** is raised to its actuated position thereby closing the contacts **124—134** and **125—136**. As a conductive line **148*a*** passes under the sensing wires **138** and **140**, it completes a circuit from the plus 12 volt potential at the point **204** through the line **126**, contacts **124—134**, sensing wires **138**, the conductive line **148*a***, sensing wires **140**, contacts **125—126** and the line **128**, and changes the potential on the first grid to a positive potential with respect to the cathode. The thyratron **180** conducts and energizes the magnet **78** in the plate circuit thereby releasing the tab check lever **38** and the rebound check lever **50** to engage a tab stop **46**. The operating lever **160** is restored by the spring **178**, opening the contacts **174** and restoring the circuit to normal.

As the member **130** rises, it comes to a point where the sensing wires **138** and **140** can make contact if a conductive line is present. However, it is not desirable to permit contact so soon, since it might result in premature release of the tab check lever **38** and selection of a tab stop located ahead of the one desired. Consequently, the contacts **124—134** and **125—136** are provided which control the exact point at which the wires **138—140** are connected to the grid circuit of the thyratron **180**. As the member **130** continues to rise, it crosses two typing spaces within which it is desirable to make contact if a conductive line **148*a*** is present. If this sweep-pickup were not provided, the typist could not type as closely to the end of a tab field as with a conventional tab mechanism, and the mechanism would not be able to detect a very short field at all. As here constructed, this device can tabulate a minimum distance of two tab stops, which is comparable to the conventional tab mechanisms. This means that the operator may type to within two spaces of the next tab stop and the tab mechanism is still effective to select that next stop.

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

What is claimed is:

1. In a business machine having a movable carriage, means for releasing said carriage for power driven movement, a plurality of stop members carried by said carriage, means operable for engagement selectively with said stop members for stopping said carriage, and means operable in response to the sensing of a predetermined condition on said movable carriage for operating said engageable means, said last mentioned means including a sensing means mounted adjacent said carriage and movable from an inoperative position to an operative position wherein it senses said predetermined condition.

2. In a business machine having a movable carriage adapted for holding a print page, a tabulating mechanism for releasing said carriage for power driven movement, a tab check lever in said tabulating mechanism, means urging said tab check lever normally into an operative position, a plurality of tab stops selectively engageable with said tab check lever when the latter is in its operative position for stopping said carriage, a device for restraining said tab check lever from engagement with said tab stops, means operable for disabling said restraining device, sensing means mounted adjacent said carriage and movable from an inoperative position to an operative position wherein it senses indicia on said print page, and circuit means operative in response to the sensing of said indicia for operating said disabling means.

3. In a business machine having a movable carriage, a tabulating mechanism for releasing said carriage for power driven movement, a tab check lever in said tabulating mechanism, spring biased means urging said tab check lever normally into an operative position, a plurality of tab stops selectively engageable with said tab check lever when the latter is in its operative position, a device for selectively restraining said tab check lever from engagement with said tab stops comprising a latch blade, means pivotally mounting the same for movement from a blocking position wherein it will block movement of said tab check lever into an operative position to a clear position wherein said tab check lever may be moved into its operative position by its spring biased means, sensing means movable from an inoperative position to an operative position wherein it will complete a circuit in response to the detection of a predetermined condition on said movable carriage, and means responsive to the completion of said circuit for positioning said latch blade in its clear position.

4. In a business machine having a movable carriage adapted for holding a print page, a tabulating mechanism for releasing said carriage for power driven movement, a tab check lever in said tabulating mechanism, means urging said tab check lever normally into an operative position, a plurality of tab stops selectively engageable with said tab check lever when the latter is in its operative position for stopping said carriage, a device for selectively restraining said tab check lever from engagement with said tab stops, means operable for disabling said restraining device, sensing means mounted adjacent said carriage and movable from an inoperative position to an operative position wherein it senses indicia on said print page, and circuit means operative in response to the sensing of said indicia for operating said disabling means.

5. In a business machine having a movable carriage, a tabulating mechanism for releasing said carriage for power driven movement, a tab check lever in said tabulating mechanism, spring biased means urging said tab check lever normally into an operative position, a plurality of tab stops selectively engageable with said tab check lever when the latter is in its operative position, sensing means for emitting an impulse in response to the detection of a predetermined condition on said movable carriage, said sensing means being movable from an inoperative position to an operative position, a device for selectively restraining said tab check lever from engagement with said tab stops comprising means blocking the operation of said tab check biasing means, and means responsive to an impulse from said sensing means for disabling said blocking means.

6. In a business machine having a movable carriage, a tabulating mechanism for releasing said carriage for power driven movement, a tab check lever in said tabulating mechanism, spring biased means urging said tab check lever normally into an operative position, a plurality of tab stops selectively engageable with said tab check lever when the latter is in its operative position, a device for selectively restraining said tab check lever from engagement with said tab stops comprising a latch blade, means pivotally mounting the same for movement from a blocking position wherein it will block movement of

said tab check lever into an operative position to a clear position wherein said tab check lever may be moved into its operative position by its spring biased means, a crank arm for pivoting said latch blade, sensing means movable from an inoperative position to an operative position wherein it will complete a circuit in response to the detection of a predetermined condition on said movable carriage, electro-mechanical means connected to said crank arm, and means responsive to the completion of said circuit for operating said electro-mechanical means to pivot said latch blade to clear position.

7. In a business machine having a movable carriage adapted for holding a print page, a tabulating mechanism operable for releasing said carriage for power driven movement, a tab check lever in said tabulating mechanism, spring biased means urging said tab check lever normally into an operative position, a plurality of tab stops selectively engageable with said tab check lever when the

latter is in its operative position for stopping said carriage, a device for restraining said tab check lever from engagement with said tab stops, means operable for disabling said restraining device, sensing means comprising a fixed contact member, a movable contact member having sensing brushes engageable with said print page on said carriage and adapted for sensing conductive marks on said page for completing a circuit between said brushes, said movable member being movable from an inoperative position to an operative position wherein it engages said fixed contact member for completing a circuit therebetween, and means operable when said circuit is completed through said brushes and a said conductive mark and through said fixed and said movable contact members for operating said disabling means.

No references cited.