Jan. 7, 1958 T. H. TOEPPEN 2,818,961

ELECTRONIC TABULATION

Filed Dec. 27, 1955 2 Sheets-Sheet 1

FIG. 1

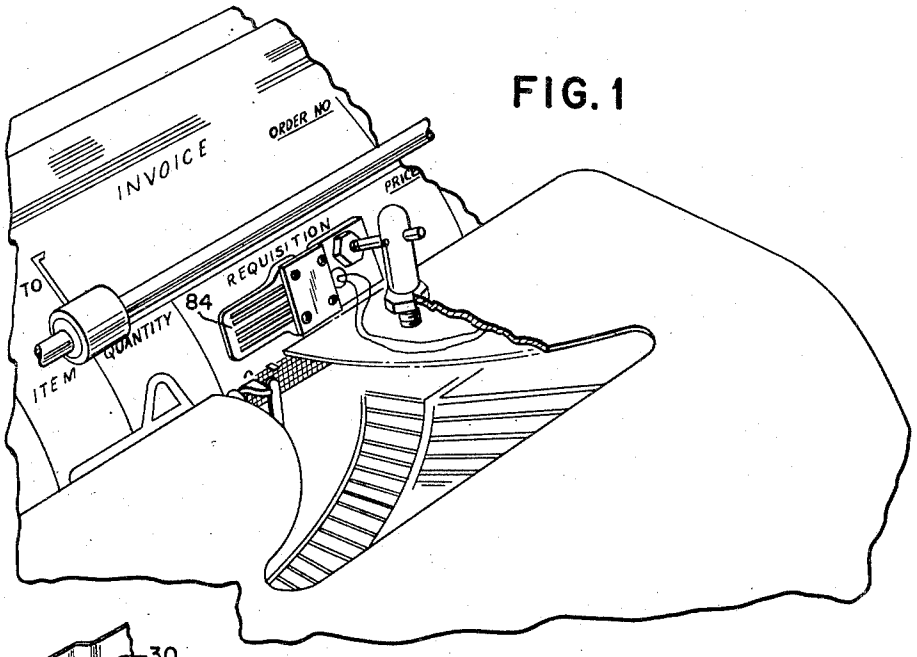

FIG. 2

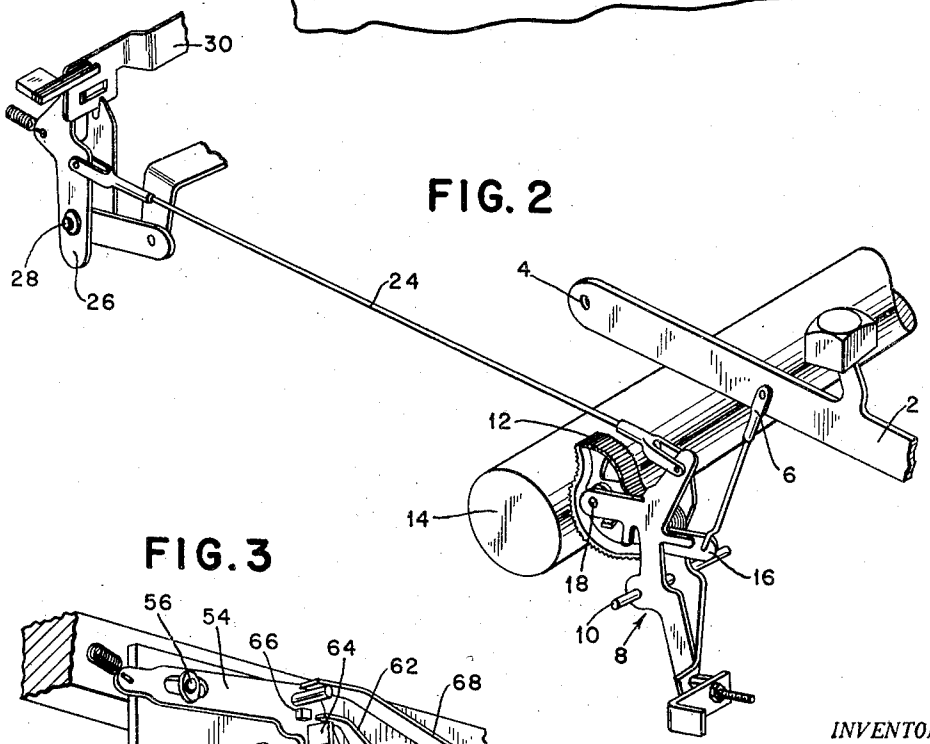

FIG. 3

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ELECTRONIC TABULATION

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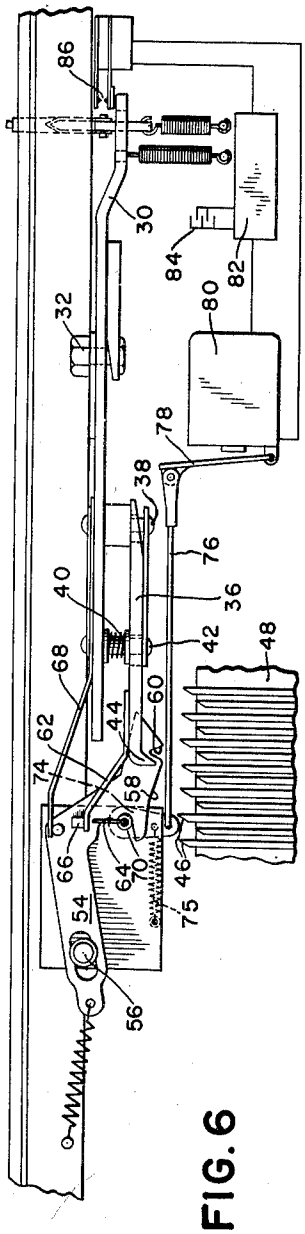

FIG. 6

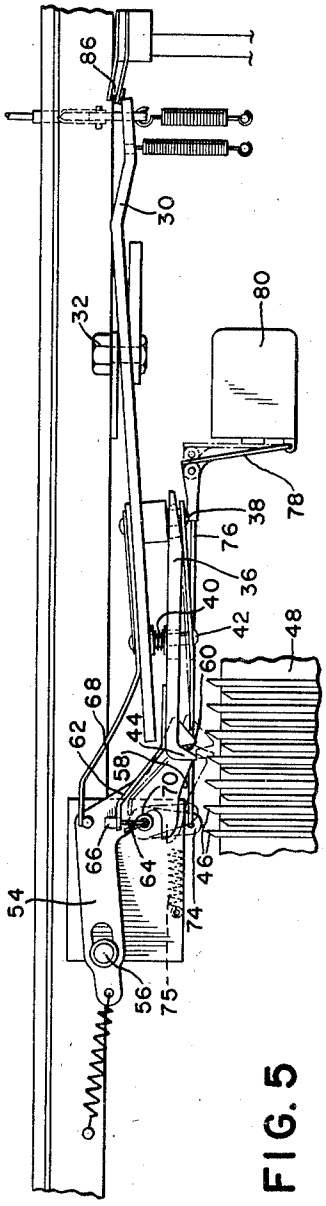

FIG. 5

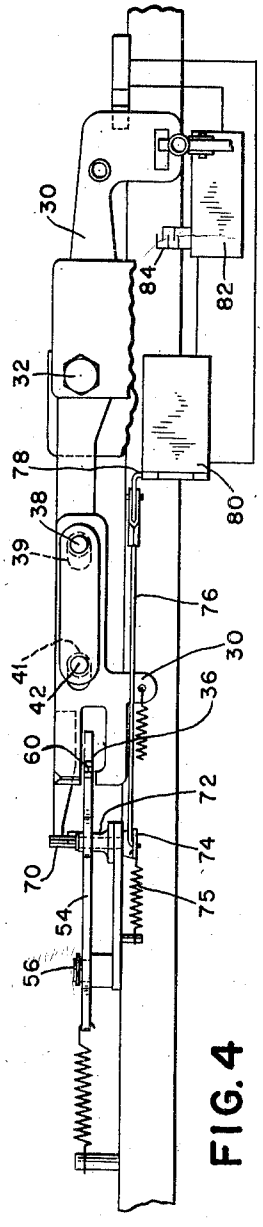

FIG. 4

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ELECTRONIC TABULATION

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Application December 27, 1955, Serial No. 555,529

7 Claims. (Cl. 197—176)

This invention relates to an improved electrically controlled tabulating mechanism of the type shown in copending application Serial No. 487,425, filed February 10, 1955, and more particularly to an improved electrically controlled stop for a tabulation mechanism.

It is a first object of this invention to provide an improved electrically controlled stop for a tabulating mechanism which is accurate in the selection of the column in which the carriage is to be stopped.

It is a further object of this invention to provide an improved electrically controlled stop for a tabulating mechanism which will act to stop the carriage accurately irrespective of the speed of the carriage or the distance of tabulation travel.

It is a further object of this invention to provide an improved electrically controlled stop for a tabulating mechanism which requires much less electric power for operation than those previously known in the art.

It is a still further object of this invention to provide an improved electrically controlled stop for a tabulating mechanism wherein the operating time from the instant of sensing of a conductive line to the instant of conditioning the mechanism for stopping is less than those previously known in the art.

It is a still further object of this invention to provide an electrically controlled stop for a tabulating mechanism wherein the location of the conditioning point on the form can be much closer to the actual stopping point on the form than structures previously known in the art.

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.

Referring to the drawings,

Fig. 1 is a perspective view of the front cover of a typewriter showing a form on the typewriter platen and a reading head.

Fig. 2 is a perspective view of a tabulating operating mechanism of a typewriter.

Fig. 3 is a front elevation of a portion of an electrically actuated trigger mechanism.

Fig. 4 is a rear elevation of a typewriter tabulation mechanism.

Fig. 5 is a plan elevation of the tabulating mechanism shown in its cocked position.

Fig. 6 is a plan elevation of a tabulating mechanism shown in its rest position.

Briefly, this invention relates to an improved electrically controlled stop for a tabulating mechanism of a business machine carriage wherein the carriage is released for tabulation flight by conventional mechanism but wherein the carriage is stopped in response to a signal generated by the page being printed. The generated signal triggers a magnet which acts through linkages to effect the actual stopping of the carriage.

In order to understand the operating principles of this invention, reference must first be made to a conventional

tabulation mechanism such as that shown in U. S. Patent 2,157,053. As shown in that patent, and in the subject drawing, a key lever 2 is pivotally supported at a fulcrum wire 4 for rocking action into and out of an actuating position. The key lever 2 is connected via a link 6 to a cam assembly which, in turn, is pivotally supported at a fulcrum 10. The cam assembly is provided with a cam 12 which is selectively engageable with a continuously rotating power roll 14. More specifically, the link 6 rocks a trip lever 16 about a fulcrum 18 to release cam 12 into engagement with the power roll thereby causing the cam to make a half revolution. The half revolution of the cam rocks the cam assembly 8 clockwise about its pivot 10 to exert a pull on link 24 which is connected to a crank arm 26. The latter is pivotally supported on the carriage frame by means of a stud 28 and as a result of the pull on link 24, the outer end of the crank arm acts on tab lever 30 to pull it to the right as viewed in Fig. 2.

With reference now to Figs. 4, 5 and 6 of the drawings, the tab lever 30 is pivotally supported for rocking movement about a stud 32 from a rest position (Fig. 6) to an active position (Fig. 5).

The tab lever 30 carries a tab check lever 36 which is pivotally supported at one end by a stud 38 carried by the tab lever, and is urged outwardly to be basically parallel to the tab lever by a spring 40 which is supported about a stud 42 carried by the tab lever. The tab check lever 36 is slidable within limits of slots 39, 41, Fig. 4, which engage studs 38, 42 respectively, and further it can be moved clockwise about the stud 38 to the solid line position shown in Fig. 5, against the compression of the spring 40.

In conventional operation, the tab check lever 36 remains parallel to the tab lever 30, and when the latter is moved to an active position, a nose 44 on the tab check lever is positioned to engage a counter stop 46 carried by a conventional tab rack 48. After the nose 44 of tab check lever engages a counter stop, the tab check lever is driven to the right, as viewed in Figs. 4, 5 and 6, within the limits of slots 39, 41 to release the tab lever assembly back to its rest position.

The tab mechanism is further provided with a rebound check lever 54 which is pivotally supported about a stud 56 carried by the carriage frame. The rebound check lever, in the cocked position, dotted line position shown in Fig. 5), is engageable with tab counter stops 46 in a manner wherein an inclined surface 58 of the rebound check lever will first engage one of the stops 46 causing rebound check lever 54 to be rocked counterclockwise about its stud 56. After the nose 44 of the tab check lever engages a counter stop, however, and is moved to the right within the limits of the slots 39, 41 (restoring the tab check lever to solid line position), the notch 60 of the rebound check lever will snap back over the stop 46 to prevent a rebound of the carriage. Then, when the carriage comes to rest, the rebound check lever and tab check lever are restored to their Fig. 6 positions. Again, the complete details are shown in U. S. Patent 2,157,053.

In the improved tab stop mechanism covered by this invention, the tab lever 30 is moved to its active position in response to the depression of the tab key lever 2, but the tab check lever 36 and the rebound check lever 54 are held out of engagement with the tab counter stops 46, until a predetermined signal has been received. The mechanism for accomplishing this result is shown particularly in Fig. 5, wherein the solid line position shows the tab check lever 36 and the rebound check lever 54 in their cocked but inoperative positions, and wherein the dotted line positions show the tab check lever 36 and rebound check lever 54 in their operative positions.

Actually, the tab check lever 36 is provided with an

integral extension 62 which is engageable with a latch blade 64, later described. The rebound check lever 54 is equipped with a pin 66 which is engageable with a lower portion of the latch blade 64 (shown more clearly in Fig 3). With the arrangement of parts as shown in Fig. 5, it can be recognized that if the blade 64 is removed from the path of the extension 62 and the pin 66, then the spring 40 and a tab lever spring 68 will cooperate to push the tab check lever 36 and rebound check lever 54 to their dotted line positions.

It is apparent then, that the operating principle of this invention hinges upon the actuation of the latch blade 64, which, in turn, is controlled by the following mechanism: With specific reference to Fig. 3, the latch blade 64 is mounted on a shaft 70 which extends through a post 72 supported on the typewriter frame. The shaft 70 is further provided with a lower crank arm 74 and it is apparent that any movement of the crank arm 74 to the right as viewed in Fig. 6, will rock the latch blade 64 counterclockwise (to a tripping position) to disengage it from the pin 66 of the rebound check lever and from the extension 62 of the tab check lever, permitting the two pieces to move to their dotted line positions of Fig. 5.

In order to control the rocking of the shaft 70 to the tripping position, a link 76 is interconnected between the crank arm 74 and an armature 78 of a magnet 80. Normally, the crank arm 74 is held to a clockwise limit by means of a spring 75 thereby assuring that the latch blade 64 will be engageable with the associated latch parts of the tab check lever and rebound check lever.

With the mechanism shown, it is apparent that upon the energization of magnet 80, the armature 78 will be attracted thereto and, acting via link 76, will rock the crank arm 74 counterclockwise and thereby remove the latch blade from the path of the rebound check lever and rebound tab lever permitting them to move to their active positions shown in the dotted line view of Fig. 5.

It should be mentioned here that, in the operation of this tabulation mechanism, all of the tab counter stops 46 on the tab rack are moved manually to their operative position before any tab operation is started. It then becomes necessary, once a tab run has been started, for the tab check lever to be moved only the last fraction of an inch, from its solid line position to its dotted line position of Fig. 5, in order to stop a tabulation run.

The operation and energization of the magnet 80 is controlled basically by a power supply 82 not described, and a reading finger 84, both of which are described in detail in copending application Serial No. 487,425, filed February 10, 1955. Briefly, however, the finger 84 is positioned to read a conductive line on a form, whereupon the power supply 82 is triggered to send a pulse into magnet 80 to cause the armature 78 to be attracted to it. Incidentally, magnet 80 is in a circuit controlled by contacts 86, Figs. 4, 5 and 6, which, in turn, are closed only when tab lever 30 is in its active position.

It will be noted that when the rebound check lever 54 and the tab check lever 36 are in their normal positions (viewed in Fig. 6) that the latch blade 64 has clearance to rotate under the extension 62 and stop 66 respectively. Accordingly, the latch blade 64 will be restored by spring 75 after the magnet 80 has been deenergized by tab lever 30 being reset and thereby opening contacts 86.

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, 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 counter 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, a device for selectively restraining said tab check lever from engagement with said counter 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, and means responsive to an impulse from said sensing means for positioning said latch blade in its clear position.

2. 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 counter 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, a device for selectively restraining said tab check lever from engagement with said counter 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, spring means biasing said latch blade normally into its blocking position, and means responsive to an impulse from said sensing means for positioning said latch blade in its clear position.

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 counter 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, a device for selectively restraining said tab check lever from engagement with said counter 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, electro-mechanical means connected to said crank arm, and means responsive to an impulse from said sensing means for operating said electro-mechanical means to pivot said latch blade to clear position.

4. 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 counter stops selectively engageable with said tab check lever when the latter is in its operative position, and sensing means for emitting an impulse in response to the detection of a predetermined condition on said movable carriage, a device for selectively restraining said tab check lever from engagement with said counter 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, spring means biasing said latch blade normally into its blocking position, a crank arm for pivoting said latch blade, electro-mechanical means connected to said crank arm, and means responsive to an impulse from said sensing means for operating said electro-mechanical means to pivot said latch blade to clear position.

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 counter stops selectively engageable with said tab check lever when the latter is in its operative position, and sensing means for emitting an impulse in response to the detection of a predetermined condition on said movable carriage, a device for selectively restraining said tab check lever from engagement with said counter stops comprising means blocking the operation of said tab check lever by said spring biased 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 counter stops selectively engageable with said tab check lever when the latter is in its operative position, and sensing means for emitting an impulse in response to the detection of a predetermined condition on said movable carriage, a device for selectively restraining said tab check lever from engagement with said counter stops comprising

means blocking the operation of said tab check lever by its spring biased means, electro-mechanical means, link means interconnecting said electro-mechanical means with said blocking means to disable the latter when said electro-mechanical means is energized, and circuit means operative in response to a pulse from said sensing means to energize said electro-mechanical means.

7. 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 counter stops selectively engageable with said tab check lever when the latter is in its operative position, and sensing means for emitting an impulse in response to the detection of a predetermined condition on said movable carriage, a device for selectively restraining said tab check lever from engagement with said counter stops comprising a latch blade, pivot means mounting said latch blade for movement from a check lever blocking position to an unblocking position, means biasing said latch blade normally into its blocking position, magnet means having a movable portion, circuit means for energizing said magnet means in response to a signal emitted by said sensing means, and linkage means inter-connecting the movable portion of said magnet means with said pivot means to pivot the latch blade to its unblocking position in response to the energization of said magnet means.

References Cited in the file of this patent

UNITED STATES PATENTS

1,071,860	Bernard	Sept. 2, 1913
1,935,436	Crumrine	Nov. 14, 1933