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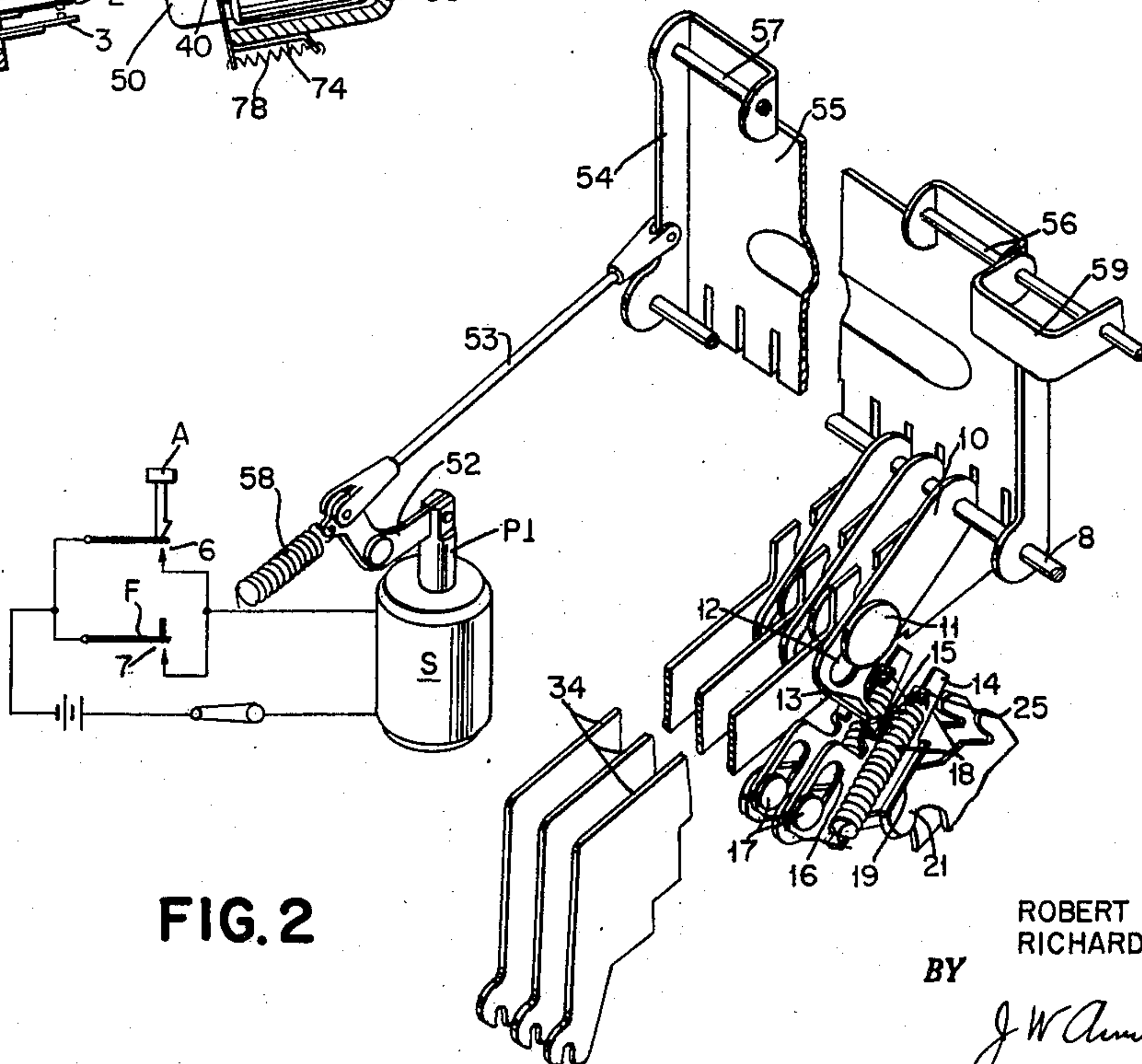
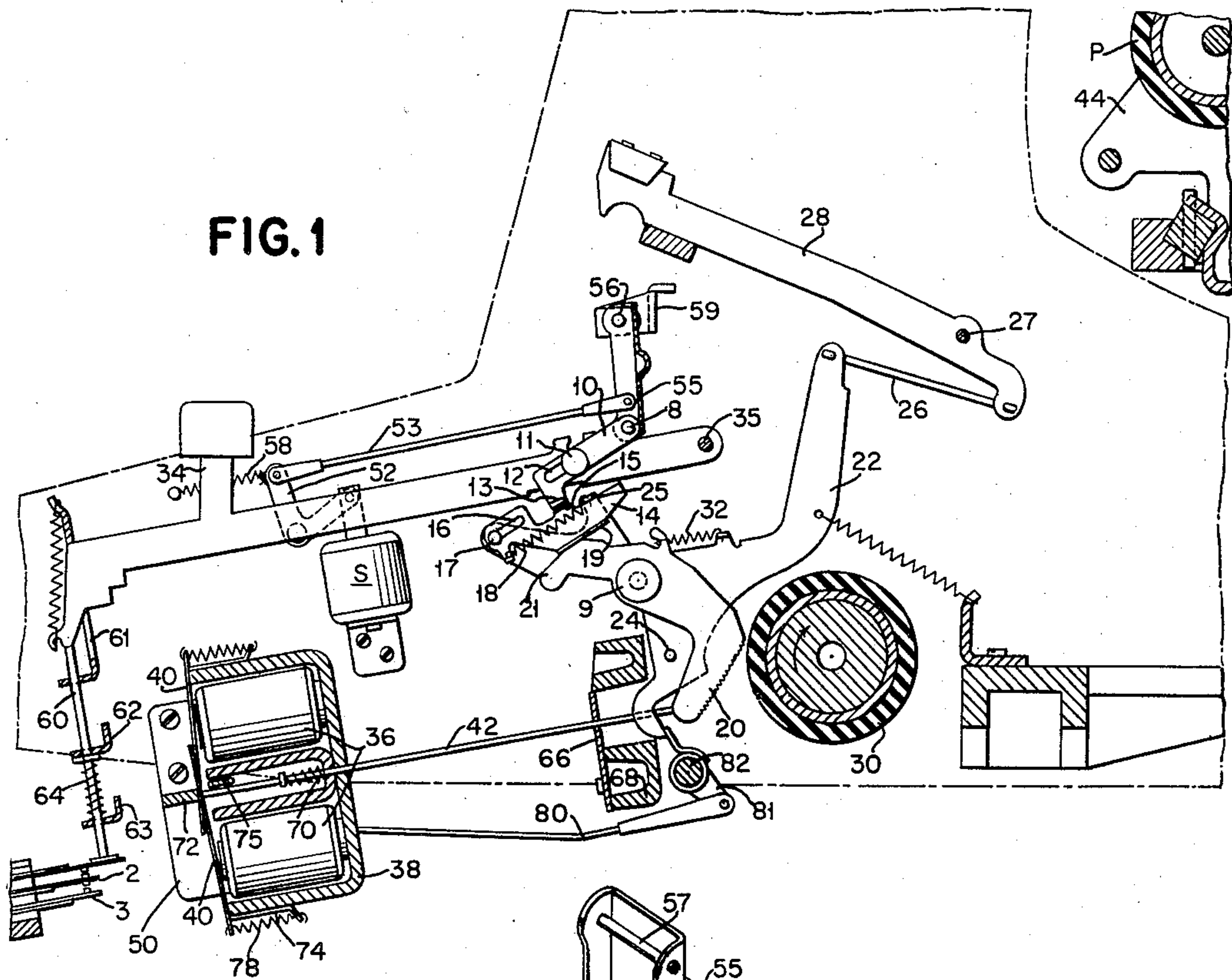
R. R. SEEBER, JR., ET AL

2,850,136

TYPEWRITER KEY CONNECTING DEVICES

Filed Sept. 13, 1956.

3 Sheets-Sheet 1



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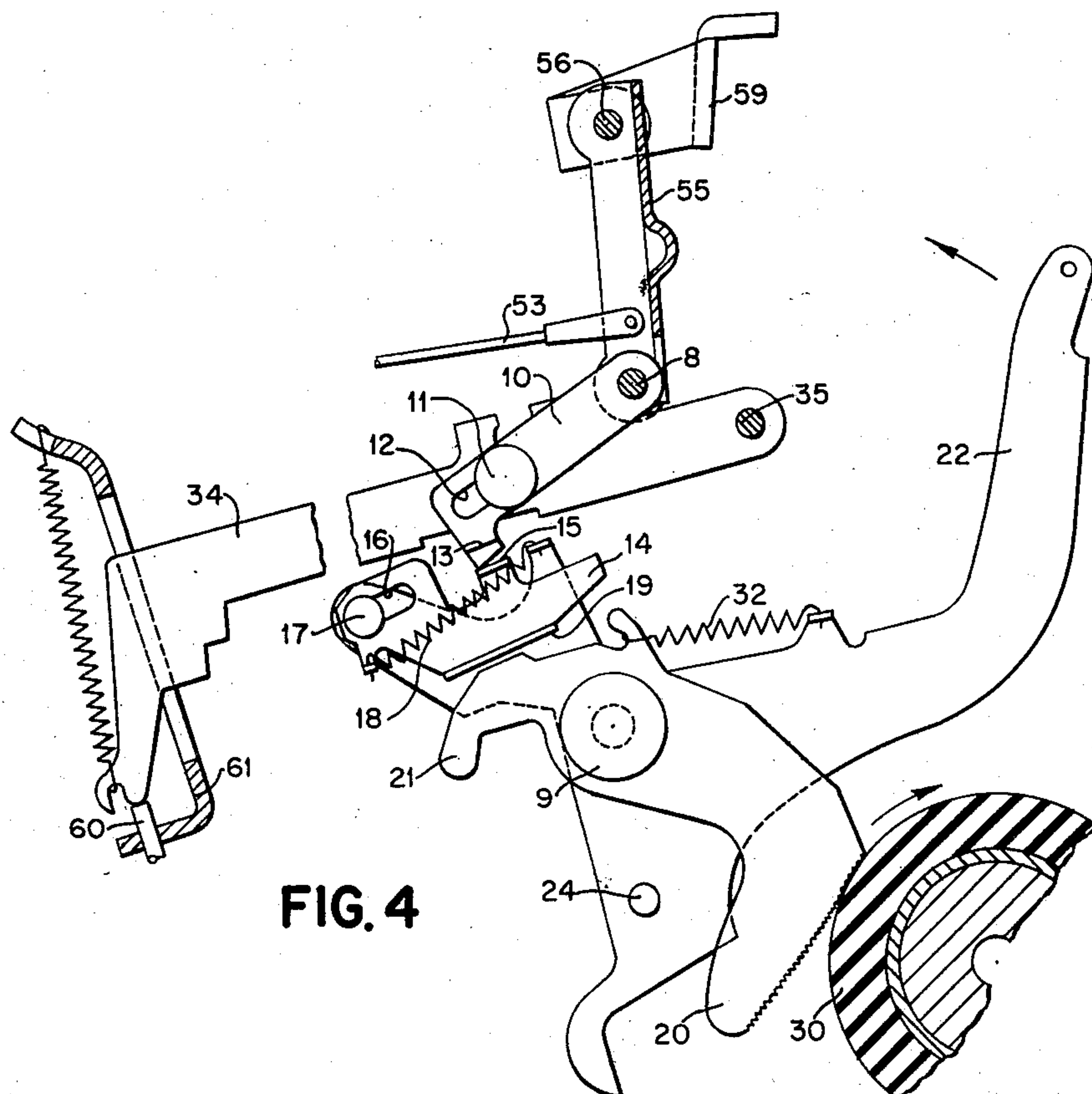
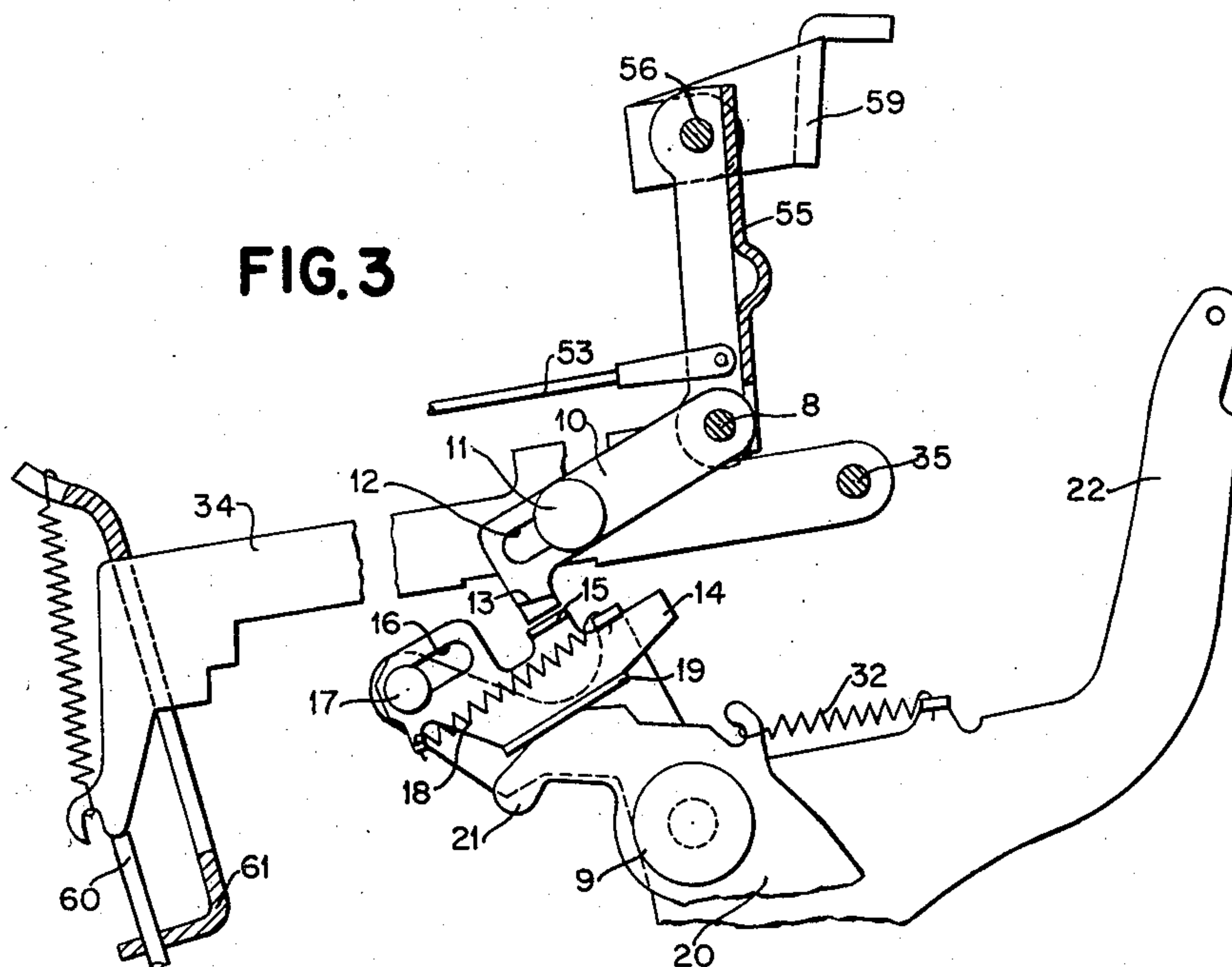
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FIG. 5

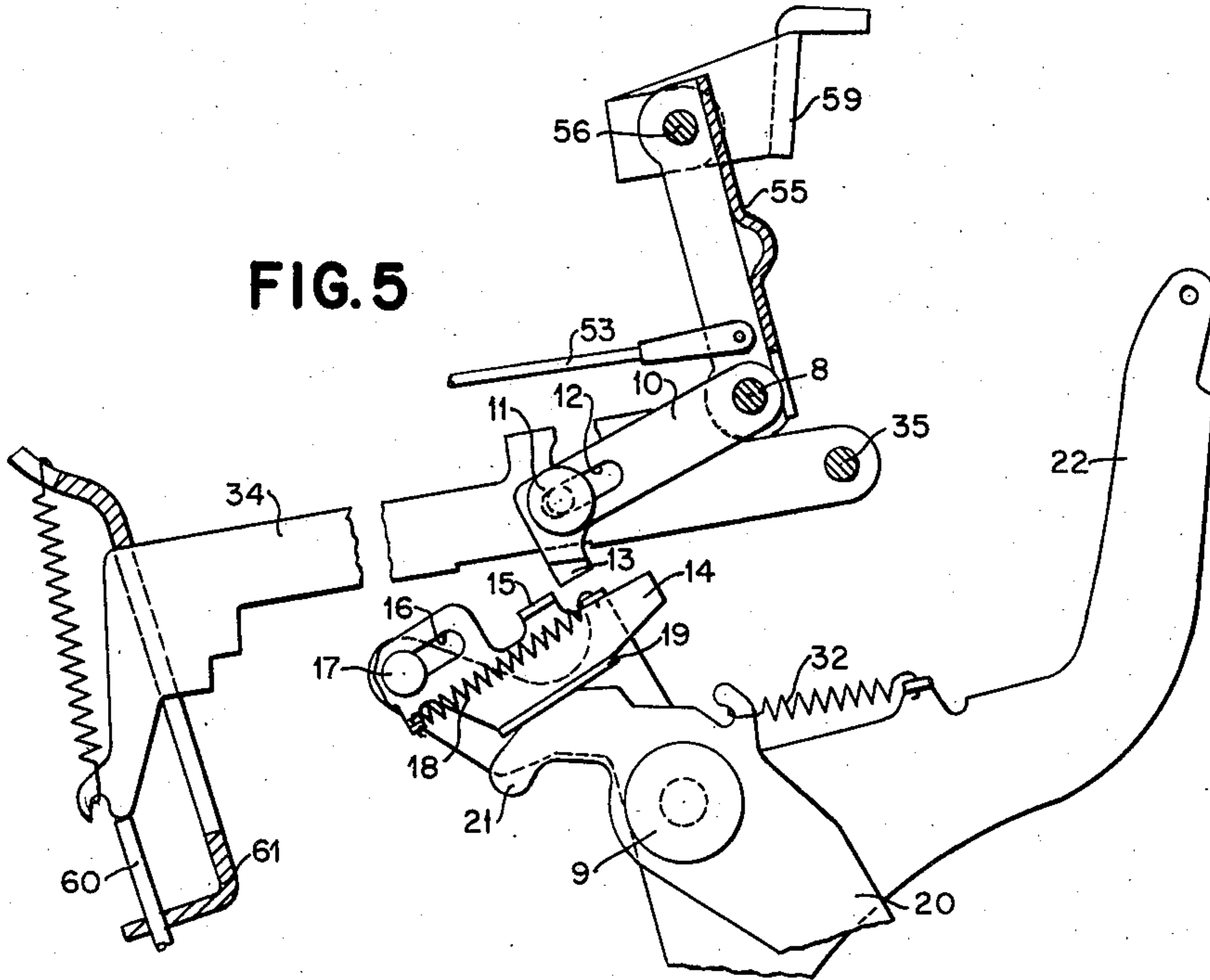
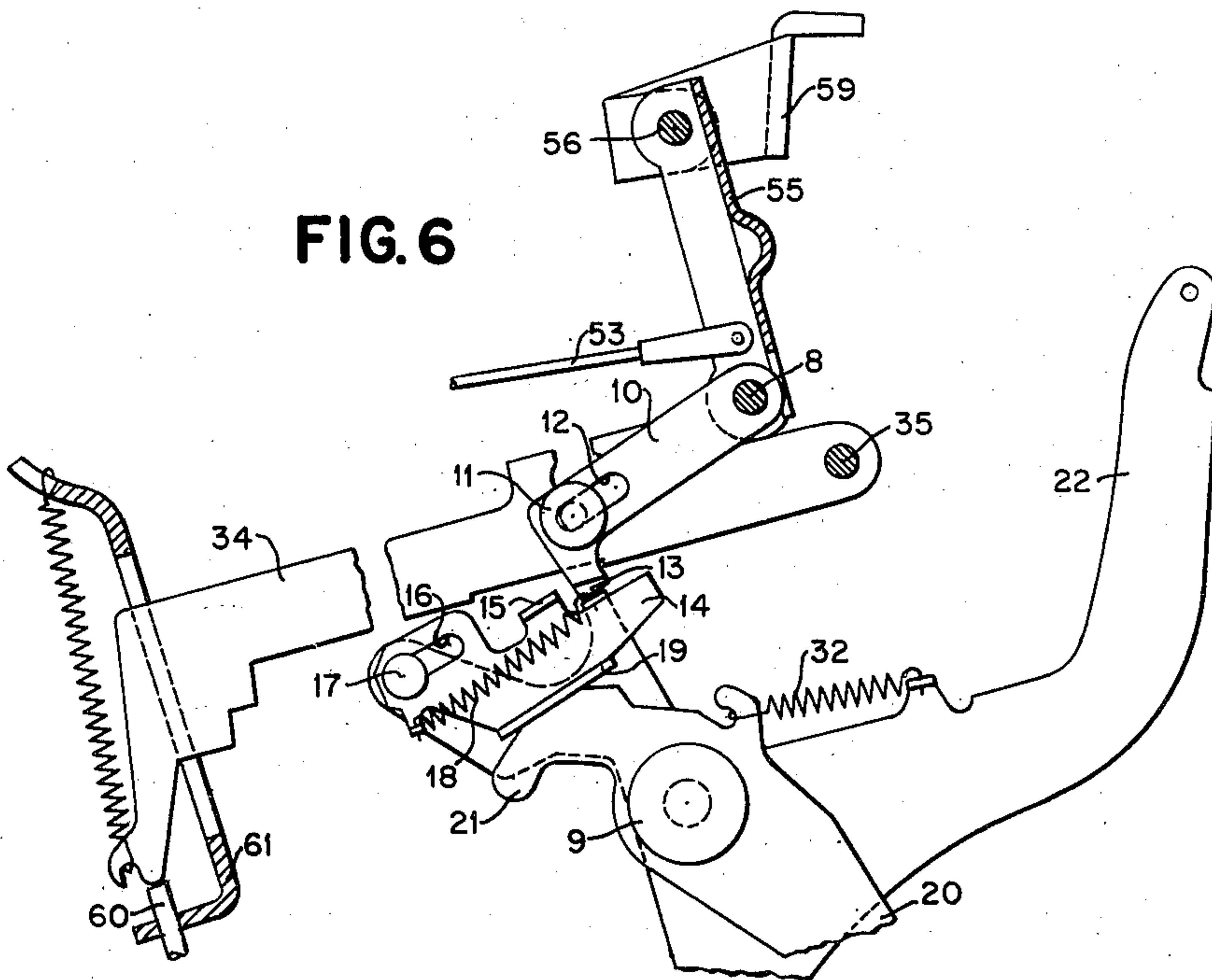


FIG. 6



2,850,136

TYPEWRITER KEY CONNECTING DEVICES

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Application September 13, 1956, Serial No. 609,633

8 Claims. (Cl. 197-7)

This invention relates to improvements in typewriting machines and more particularly to a novel connecting means between the keys of an electric typewriter and the power mechanism for operating the type bars. By means of this connecting means or mechanical interlock, it is made possible to operate the typewriter manually in the usual way and also disconnect the keys so that an automatic word writing operation may be performed.

The devices involved are disengageable connections between typewriter key levers and the trip release members of a power mechanism. The novel connection is in the form of a short sliding connector with a foot that normally overlies a lug on the cam trip member. Each slide connector is loosely mounted on a key lever and all members are joined by cross rod of a bail which is operated by a solenoid for disconnection of all connectors when automatic operation is desired.

Among other advantages, these devices retain the ease of operation of the electric typewriter while providing for automatic word writing control. It was found that when an automatic typewriter was provided with only electrical key contacts for manual operation, such operation was difficult for the operator because contact control required full release of a key before another key could be depressed. This seriously affected the "touch" of the keyboard and required extra training of the typist to prevent accidental loss of letter recordings. With the present mechanical connection between key and power trip lever, there is possible the normal rolling touch from one key to the next and ease of typing is restored. This is an improvement in a word writing typewriter of the kind disclosed in Patent No. 2,717,686, issued September 13, 1955, to Robert R. Seeber, Jr. In the patent the key controls are purely electrical as distinguished from the combined mechanical and electrical controls of the present case.

Therefore, it is a further object of the invention to provide in an automatic word writing typewriter the means for manual and mechanical operation of the individual character trip levers.

Another object of the invention is to provide typewriter controls with both mechanical and electrical operating instrumentalities and a selecting means for choosing one or the other.

A feature of the invention is the provision of a slidable connection which practically eliminates lost motion between the key lever and the trip release member of an automatic typewriter. There results a firm quick response to key operation.

Another object of the invention is the provision of improved means for adapting a typewriter key mechanism for dual use as a word writing selector under certain conditions and as an ordinary letter typing control means under other conditions. In carrying out this object the key controls are provided with devices responsive both mechanically and electrically. For automatic operation a word key is depressed and a letter key such as an "A"

key closes contacts to cause automatic printing of the words "A PLEASURE TO." At the time such contacts are effective to call the word selections out of storage, the mechanical connection is disabled so that printing is wholly automatic. When the mechanical connection is effective, the contacts are also closed for each key depression, but at such times they are ineffective to call word printing out of storage because the word key has not been actuated and therefore the circuits for the electrical controls are not completed.

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.

Fig. 1 is a sectional elevation view of the automatic typewriter key controls and printer mechanism.

Fig. 2 is a perspective view of several connector slides and the bail for operating them.

Fig. 3 is a side elevation view of the slide connector in the normal position and ready for manual operation of the typewriter.

Fig. 4 is a view of the parts as shown in Fig. 3 but with the key lever depressed and the trip cam operated for printing.

Fig. 5 is a side elevation view of the slide connector in the shifted or automatic word writing position in which it is disconnected from the trip mechanism. Since the key lever does not cause tripping of the single print lever, it is then free to be depressed for electrical selection of word and phrase printing by several print levers automatically and sequentially.

Fig. 6 is a view of the parts as shown in Fig. 5 but with the key lever depressed for automatic word writing selection. It is noted that the related print lever trip mechanism is not actuated by the key because at such times it is operated independently and automatically as part of a selected word or phrase.

It may be pointed out that between the keys and the tripping devices for the print mechanism there are electrical controls for automatic word typing as set forth in the U. S. Patent No. 2,717,686 issued to R. R. Seeber, Jr.

Fig. 1 shows the general assembly of the key lever and printer mechanisms and the way the novel connections are coordinated therein.

In Fig. 1 it is seen that the automatic typing devices include a power roller 30, a cam 20 driven thereby, a print operating lever 22 and a type bar 28 connected to the cam 20, a trip release member 14 on the operating lever 22, and an operating key lever 34 for either closing contacts 2, 3 for automatic operation or operating the trip member 14 mechanically, characterized by the provision of a slide connector 10 on the key lever, said connector having an extension 13 which normally overlies a lug 15 on the trip member 14 but is disengageable therefrom, whereby the key lever 34 may close contacts 2, 3 to select automatic word typing without tripping the power mechanism directly.

The printing action of the typewriter illustrated herein and to which the present improvements are applied is adapted for power operation under the influence of a constantly rotating power roller 30 which is driven in any well known manner, as by an electric motor (not shown). Each type face is carried by a type bar 28 which is adapted to be operated into impression making contact with a record receiving sheet trained about a platen P. Each type bar 28 is pivoted on a type bar segment wire 27 about which it is rocked under the influence of a print operating lever 22 to which it is connected by means of a link 26. Each lever 22 is adapted for operation by a

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power cam 20 which is pivoted to its lever by means of a pivot stud 9. The levers 22 and the power cams 20 are normally, i. e. in inoperative condition, so disposed that a serrated surface on each cam is slightly spaced from the rotating power roller 30. This position of the cams 20 is maintained by means of an associated spring 32 which has one end thereof attached to its cam at a point above the pivot stud 9 and which has its other end attached to a forwardly projecting portion of its lever 22. As a consequence of the spring tension, the cams are normally biased about their pivot point 9 in a clockwise direction to such an extent as to provide a small space between the serrated surface of the cams and the peripheral surface of the power roller 30.

The upper left end of each lever 22 has a projecting ear from which extends a lateral stud 17 which is adapted to engage in an elongated slot 16 formed in an upstanding ear of a trip release member 14, the opposite end of the release member being guided by an intumed lug 25 on the upper end of the forwardly projecting portion of its lever 22. A spring 18 tends to hold the release member 14 in its rearwardly disposed position.

Each cam 20 has a top extension 21 which ordinarily is held in engagement with a lug 19 on the bottom of the trip release member 14, the spring 32, in the position of Fig. 1, holding the extension 21 against the lug 19. The spring 18 connected to an ear formed on the release member 14 just below the stud 17 and to a lug form on the upper part of lever 22 serves to hold the member 14 with the stud 17 at the left hand end of the slot 16 and also normally holds member 14 up against the lug holding one end of the spring. The member 14 has a lug 15 which just clears the short depending lug or extension 13 on the slide connector 10 which is the disengageable connector mentioned hereinbefore.

The trip release member 14 (Fig. 1) prevents repetitive letter printing should the key lever 34 be held down too long by the operator. Under such conditions the lug 15, when moving back to the right, encounters the left side of extension 13 and the entire member 14 is held over to the left while the spring 18 is tensioned and the stud 17 moves along slot 16. Then cam 20 is not tripped by offset 19 because member 14 remains in an ineffective position. Ordinarily, key levers 34 are released quickly enough so that extension 13 is raised to the position shown and lug 15 is free to move to the right and pass under the extension to be ready for another key selection.

When the character key 34 is depressed, the member 14 will be rocked slightly in a clockwise direction by the engagement of the lug 13 with the lug 15. This rocks the cam 20 slightly counterclockwise sufficiently to bring the upper end of the tread into engagement with the surface of the power roller 30. Directly thereafter the power roller 30 drives the cam 20 in a counterclockwise direction and, due to the eccentric shape of the tread on the cam, pushes the stud 9 to the left in a short arcuate path, thereby actuating the print operator lever 22 in a counterclockwise direction about pivot 24 and, through the link 26, operating the type bar 28 to effect an imprint from one of the types.

Slidably mounted on each of the key levers 34 is the slide connector 10 formed with a slot 12 through which is projected a headed pin 11 for holding the connector onto the key lever 34. The upper end of each slide connector 10 is formed with a small circular opening through which is threaded an operating rod 8 which passes through the entire line of connectors across the machine. The lower ends of the connectors are formed with the offset projections or lugs 13 which are normally presented directly above the cooperating lugs 15 on the related trip release members 14. The angle at which the slide connectors 10 are mounted is designed to coincide with the shape of the slot 12 and arranged so that when the con-

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nectors are shifted towards the right, the projections 13 are drawn over to the right parallel with the upper surfaces of lugs 15 and drawn out of cooperating relation with such lugs without disturbing the position of the release members 14.

Before describing the various positions of the connectors 10 and the effect exercised thereby, it is believed well to point out with reference to Figs. 1 and 2 how the connectors are moved in and out of operating position under control of a solenoid S. In Fig. 2 it is seen that the solenoid S is wired to a pair of contact controls which may be operated either by foot lever F or an automatic word writing key A. Upon either the closure of contacts 7 by the foot lever F or the closure of contacts 6 by the depression of the automatic key A, the solenoid S is energized and a linkage of parts is operated to shift the slide contacts 10 out of the normal manual operation position. The solenoid S contains a plunger P which is articulated on one arm of a bell crank 52 to the other arm of which is connected a rod 53 pivotally fastened to a side piece 54 of a bail 55 pivoted on rods 56 and 57 mounted in brackets such as 59 on the side frames of the typewriter supporting structure. A spring 58 tends to hold the plunger raised and the parts in the normal position. However, operation of the solenoid pulls the plunger P down and counteracts the pull of spring 58 and pushes to the right on rod 53 to swing the bail 55 in a counterclockwise direction. When this is done, the rod 8 is carried along therewith and all the connector slides 10 are also carried with the rod and shifted on studs 11 by sliding along the slots 12. The amount of movement imparted is enough to move the downward extensions 13 on the slide connectors over to the right far enough to miss lugs 15 so that subsequently any depression of a key lever 34 is ineffective mechanically to operate the release member 14 through the lug 13.

Once automatic operation is selected by operation of the solenoid S, then all operation of printing is automatic through the operation of magnets 36 and they in turn are selected by the word writing controls set up on stepping relays or other sequential contact closers which are selected as governed by the closure of contacts 2 and 3 (Fig. 1) by certain of the key levers 34.

These contacts 2 and 3 are part of the controls whereby a single letter key, for example the A key, may select the automatic printing of the word "acknowledge." These contacts are operated by a rod 60 which extends downwardly from an upper abutting relationship with a related key lever 34 and contacts with an insulation pad on the top contact leaf of a set of contacts. These rods 60 are guided by passing through the comb 61 which also guides the front ends of the key levers. Another pair of angles 62 and 63 provide guiding means for the lower ends of rods 60, and compression springs 64 tend to keep the rods in the raised ineffective normal position.

The sequence of automatic operation is for the operator to close "Word" key contacts 6 (Fig. 2) to condition the machine for automatic operation and to operate the solenoid S for disconnecting the mechanical connectors 10, and then depress the selected key lever 34 to call into operation desired sequences of contact closures in circuit with several different magnets 36 which then operate rods 42 to cause a selected sequence of cams 20 to be power operated and operate the desired succession of type bars 28 to print a word such as "acknowledge."

A manually operable key lever 34 is pivoted for operative contact with each release member 14 whereby downward movement thereof will rock the associated cam 20 in a clockwise direction to project its serrated surface into contact with the power roller 30. Whenever the serrated surface of a cam 20 is brought into contact with the continuously rotating power roller 30, the cam will be rocked in a clockwise direction and because of the eccentricity thereof the point of connection between the

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print operating lever 22 and the cam 20 will be moved forwardly, thereby rocking the print operating lever 22 about its pivot point 24. Such motion is, of course, effective to rock the print operating lever 22 in a counterclockwise direction and through the link 26 rock the type bar 28 in a clockwise direction about its pivot wire 27, thereby imparting a printing stroke to the type bar.

As hereinbefore stated this invention relates primarily to electrically controlled typewriters of the class wherein a succession of word writing electric impulses representative of characters are provided for energizing electromagnets which control related power cams to cause a series of typing or printing operations. It is required to provide in such typewriters an electromagnetic control for each of the character key cams, and to this end there is provided a frame member 38 which is in the form of a generally U-shaped channel and which includes mounting ears 50 at the ends thereof by means of which the channel may be attached to the side frames of the typewriter with its open side facing toward the front or keyboard end of the typewriter. Within the channel 38 are disposed a plurality of magnets 36, one such magnet for each of the character operating cams 20. As best seen in Fig. 1 of the drawing, the magnets 36 are disposed in two rows in the frame 38 and the magnets of one row are staggered in respect to the magnets of the other row. This is a convenient arrangement by means of which the magnets are assembled in a unit which is so compact as to fit in the limited space available at the front of the typewriter. The magnets 36 are selectively energized to cause the printing of characters and to perform the necessary machine functions during the course of the composition.

To the top and bottom outer faces of the supporting frame 38 are affixed armature pivot plates 74 upon which the armatures 40 are pivotally mounted. In this manner there are provided two staggered rows of armatures having the outer ends thereof pivoted in their related pivot plates 74 and having their free inner ends adjacent each other but in staggered and overlapping relation in an endwise direction. A spring 78 attached to the outwardly projecting end of each armature 40 and anchored at a spring lug formed in the pivot plate 74 serves to hold its armature 40 away from its related magnet 36 when such magnet is deenergized. A brass strip 72 which is attached to the ends of the armature frame 38, and which is disposed across the overlapping free ends of the armatures and in somewhat outwardly spaced relation thereto, serves to limit the rocking motion of the armatures in a direction away from their related magnets under the influence of the springs 78.

Each armature 40 has associated therewith a cam operating rod 42. The rod 42 has one end thereof in contact with its related armature and the other end thereof in contact with its related operating cam 20. The rod 42 passes through a slot in the wall of the magnet frame 38 and through a slotted guide plate 66 which is carried by a frame member 68 fixed to the side walls of the typewriter frame and in a position directly in front of the levers 22 and the operating cams 20. Each rod 42 is normally urged into an inoperative position with its forward end in contact with its related armature 40 by means of a spring 70 which has one end thereof in contact with a portion of the magnet frame and the opposite end thereof in contact with a collar fixed to the forward end of the rod.

It will be seen from the foregoing that whenever one of the magnets 36 is energized and its related armature 40 is attracted thereto, the rocking motion of the armature is transmitted through its related cam operating rod 42 whereby the cam 20 is rocked about its pivot point 9. This movement projects the serrated face of the cam into contact with the rotating power roller 30, and the lever 22, and its related type bar 28 is therefore operated through a printing stroke as previously described. A

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magnet 36 is provided for each of the type bar assemblies, and an operating rod 42 is provided for each of the cams 20 associated with the respective type bar operating assemblies.

There is also provided an armature knock-off mechanism which is automatically operable each time a type bar is operated under the control of one of the electromagnets. To the end that such knock-off mechanism may be effectively provided, the magnet frame 38 pivotally supports a knock-off bail 75 which is in the shape of a relatively wide inverted U. The bail, therefore, includes a generally horizontal portion which is located at the overlapping zone of the several armatures 40, and on the rear side of such armatures. The bail also provides a pair of downwardly extending legs, one at each end thereof, and the free ends of these legs are pivoted on studs fixed to the magnet frame 38. As a consequence of this arrangement, the bail 75 may be rocked on its pivots to bring it into contact with the free ends of the several armatures, thereby forcing such armatures away from the related magnet cores. This operation is useful in overcoming residual core magnetism. Each end of the bail 75 has attached thereto the forward end of an operating link 80 which extends rearwardly to a lever 81 on a ribbon lift bail shaft 82. Every time the operating assembly of cam 20 and lever 22 is actuated, the lower end of lever 22 operates lever 81 and pushes links 80 to operate bail 80 and restore the armatures.

Figs. 3-6, in showing the various positions of the slide connectors 10 and the trip members 14, illustrate the relative positions of lugs 13 and 15 and the effects of disconnection of the mechanical linkage.

In Fig. 3 it is seen that when slide connector 10 is in the normal position, the extension 13 is directly over the lug 15 of the trip member 14. Then, when the key lever 34 is depressed, the left end of connector 10 is depressed as shown in Fig. 4 and extension 13 presses on lug 15 to rock member 14 downward and press against upper end 21 of cam 20 which is rocked counterclockwise to bring the serrated edge against the power roller 30 which drives the cam further counterclockwise and the cam in turn rocks lever 22 about pivot 24 to effect printing.

Fig. 5 shows the parts as set for automatic word writing. It is mentioned hereinbefore that when automatic operation is desired, either of the contacts 6 or 7 (Fig. 2) are closed and the disengaging solenoid S is energized to push the rod 53. Turning back to Fig. 5 it is noted that the actuated rod 53, swings bail 55 and it carries rod 8 to the right with all the slide connectors 10 shifting along therewith. The extent of shifting action is evident from the position of slot 12 on stud 11 and is sufficient to move extension 13 away from lug 15 of the trip member 14. This disengaging operation of the connectors 10 sets free the key levers 34 which then may be depressed to actuate contact rod 60 (Fig. 6) and select automatic word or phrase typing without direct tripping of the manual trip member 14. In other words, for automatic typing a key such as the "F" key may be operated to cause the typing of the word "ENCLOSED" without involving the use of the "F" trip and print mechanisms. This disconnection is evident in Fig. 6 where it is noted that although the key lever 34 is depressed for contact operation, the extension 13 misses the trip member lug 15 and there is no mechanical operation of the trip mechanism. Of course, at such a time, the related cam 20 and print lever 22 may be operated automatically by energization of a magnet 36 (Fig. 1) and actuation of the push rod 42.

Although illustrated in operation with a word writing typewriter, it will be realized that the connectors 10 and associated devices are of general usefulness in a wide field of manual and automatic recording controls.

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 an electric typewriter, a series of character selection keys, a power roller, cams operable by said roller, printing mechanism operated by actuated cams, trip mechanisms operated by said keys for placing said cams selectively under control of said power roller, a connector mounted on each of said keys for connecting each trip mechanism for operation by a related key, other means for operating said trip mechanisms and means for disconnecting said connectors when said trip mechanisms are to be operated by said other means.

2. A typewriter of the kind set forth in claim 1 wherein said disconnecting means includes a bail for holding all of said connectors, a solenoid for operating said bail, and electrical selection instrumentalities operable for actuating said solenoid.

3. In an electric typewriter, a series of print mechanisms, a power mechanism, a series of trip mechanisms separately operable to place a related print mechanism under control of the power mechanism for operation, a series of key devices related to said trip and print mechanisms, contact devices separately operable by said key devices, magnets operated under control of said contact devices, means under control of said magnets for selectively operating said trip mechanisms, mechanical connectors between said key devices and said trip mechanisms for operating said trip mechanisms selectively when related key devices are operated, and control means for determining whether said trip mechanisms are to be operated by said magnets or said connectors, said control means including a disengaging means for taking the connectors out of cooperative relation with said trip mechanisms.

4. The combination set forth in claim 3 and in which said disengaging means includes a bail holding said connectors, devices for operating said bail to move said connectors to an ineffective position, and an electrical instrumentality for operating said operating devices.

5. The combination set forth in claim 4 and in which said control means includes contacts operated manually for calling said electrical instrumentality into operation.

6. The combination set forth in claim 3 and in which said connectors are slidably mounted on said key devices and formed with extensions normally cooperating with parts of said trip mechanisms but disengageable therefrom.

7. In a machine alternately usable as a typewriter in which depression of one of a series of keys effects operation of a corresponding one of a series of type bars and as a word writer in which depression of one of the same keys effects sequential operation of a corresponding group of type bars, a series of keys, a first set of individual means for operating each of said type bars, a series of mechanical connections between said keys and related ones of said individual means, a second set of individual means for actuating different predetermined sequences of said first set of individual means, means normally operable by said keys and said connections to actuate corresponding ones of said first set of individual means, other means operable by said keys to actuate certain of said second set of individual means, and means for disconnecting said connections, whereby said keys are prevented from operating said first set of individual means directly while operating said other means.

8. In a recording machine, a series of character printing mechanisms, a series of character keys selectively actuated to operate respective ones of the character printing mechanisms, mechanical interlocks between said keys and said mechanisms, a series of devices each of which is operable to actuate said character printing mechanisms in different groups, and an electrical selection instrumentality for disabling said interlocks and rendering said keys operable for control over said series of devices for group printing in preference to individual operation of the character printing mechanisms.

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