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G. F. DALY ET AL

1,777,876

PRINTING MECHANISM

Filed May 12, 1928

2 Sheets-Sheet 1

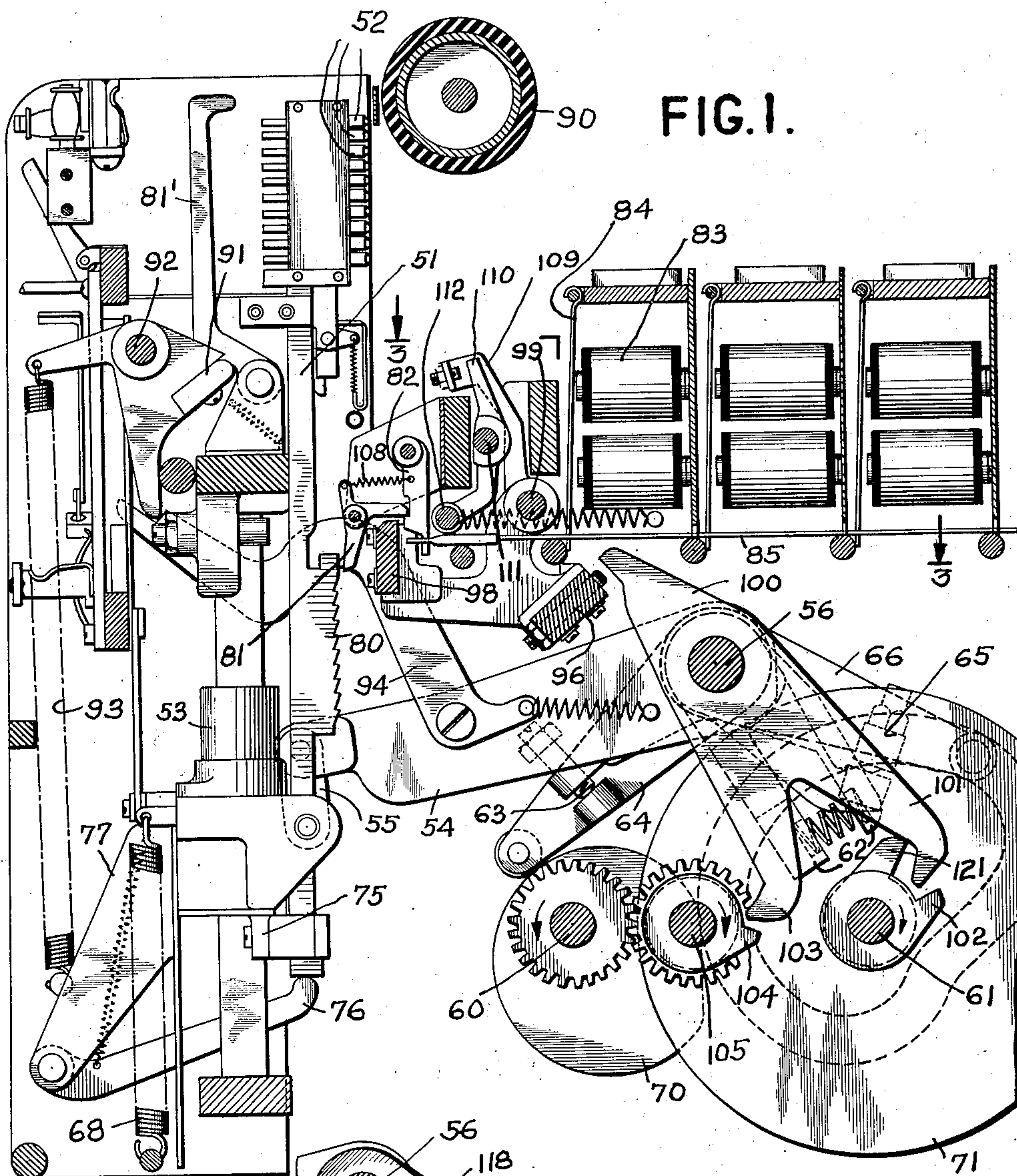


FIG. 1.

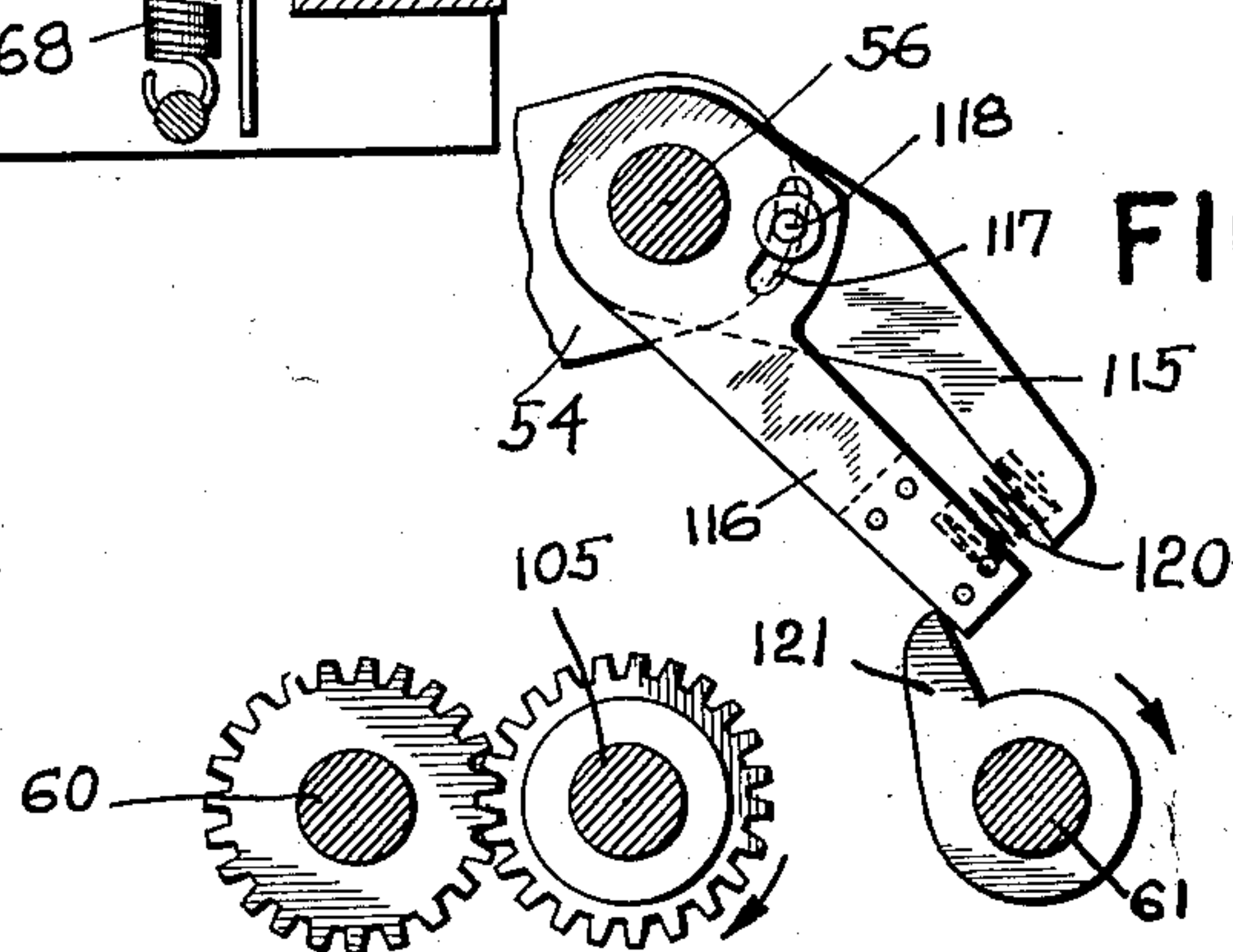


FIG. 2.

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2 Sheets-Sheet 2

FIG. 3.

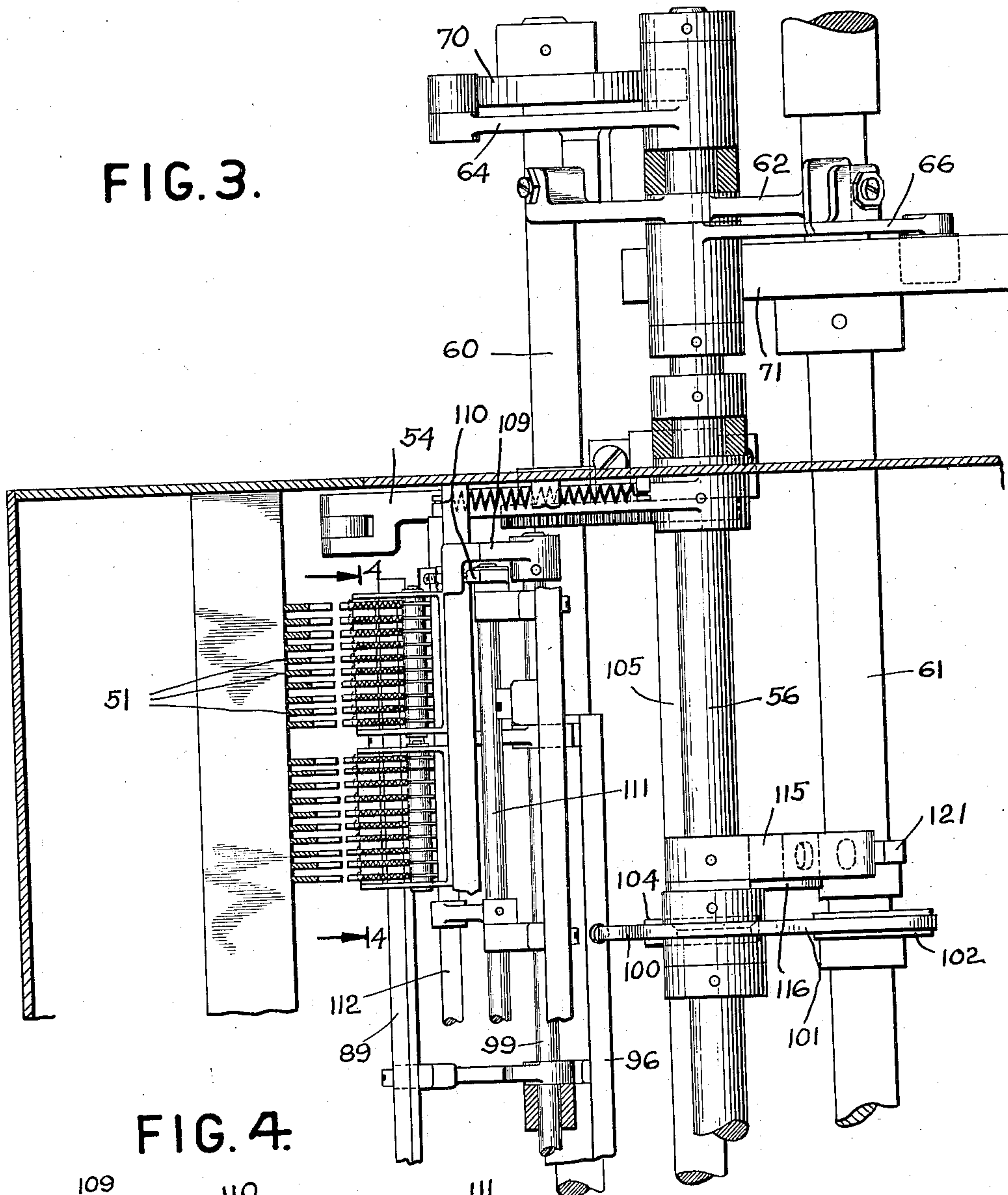
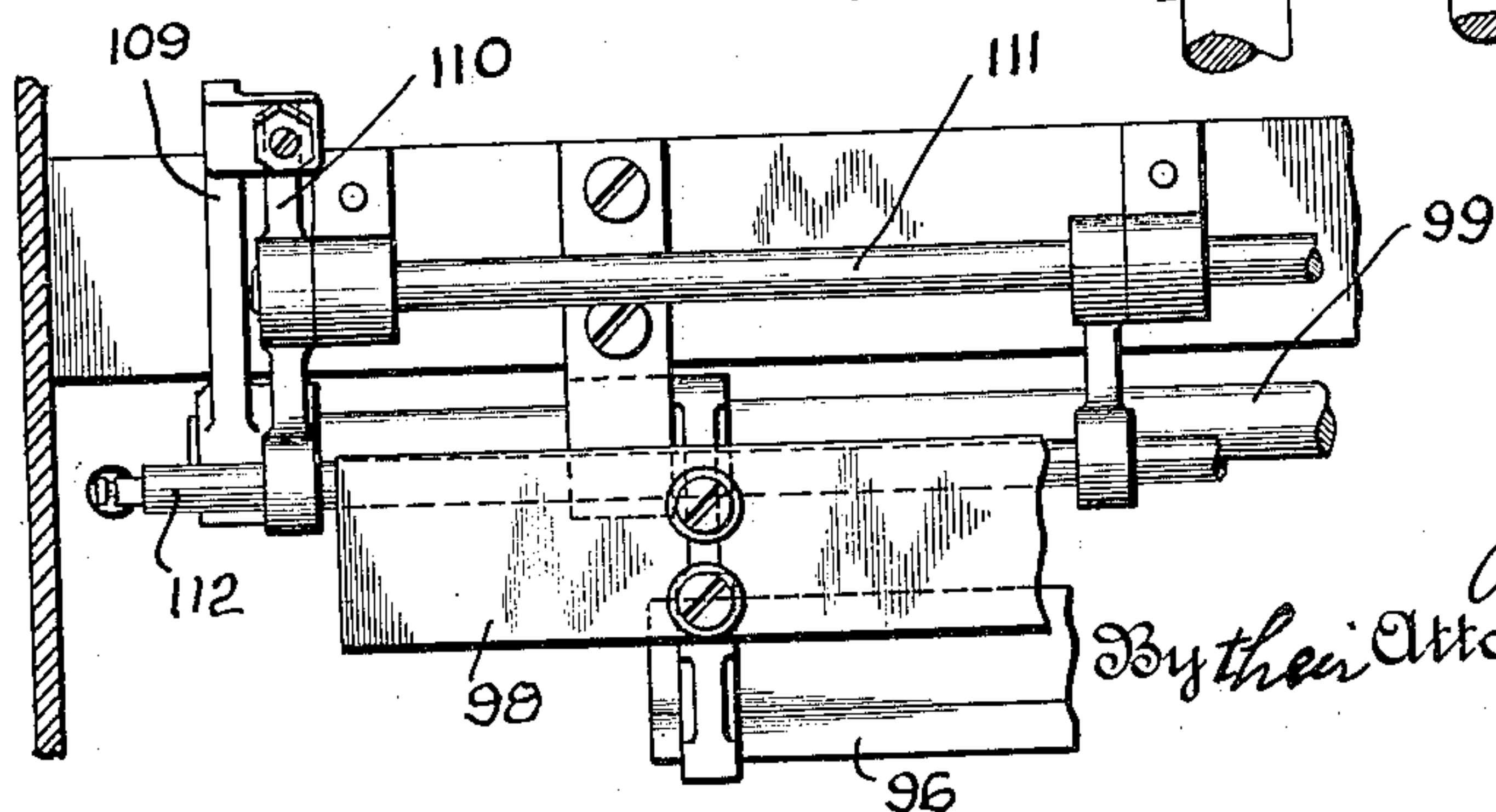


FIG. 4.



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UNITED STATES PATENT OFFICE

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PRINTING MECHANISM

Application filed May 12, 1928. Serial No. 277,177.

The invention concerns printing mechanism for printing tabulators and has for its object to provide a smooth running and fast operating printing mechanism of the reciprocating type.

The invention is particularly adapted to the printing tabulator disclosed in the copending application of Daly and Page, Serial No. 265,958, filed March 30, 1928, and will be described in connection with that mechanism.

The printing mechanism of tabulating machines is required to list items and print totals. During either operation a type bar is reciprocated to bring the several type thereon successively into printing position, the motion of the type bar being arrested at the proper time to hold the selected type in printing position. The dual operation of the type bar is effected from the listing mechanism and the total printing mechanism and as one of these is always idle while the other is operating it is necessary that a loose connection be provided somewhere in the driving mechanism for the printer so that it may drive independently from each mechanism without interference from the other stationary mechanism. The frame which carries the type bars is positively driven during its type selecting stroke but bears a floating relationship to the rest of the machine during its return stroke and there is a tendency for it to lag behind the machine during operation. That is, the frame carrying the type bars does not reach home position simultaneously with the other machine elements. Consequently the machine often picks up the printing frame while it is moving in the opposite direction to the other machine elements thus resulting in severe shocks to the several machine elements.

An object of the present invention is to prevent this lagging of the printing mechanism behind the other machine elements at the end of its stroke.

Another object is to shorten the actual stroke of the type bars without shortening their effective stroke.

Another object of the invention is to provide new and improved armature restoring

devices for the printing mechanism of an electrical controlled tabulator.

A more specific object of the invention is to provide mechanism for forcing the type carriers positively to home position toward the end of their stroke so that they reach home position in synchronism with the other machine elements and furthermore to provide spring actuated devices to effect this positive restoration so that it will not result in shocks to the machine.

These and other objects which will be pointed out as the description proceeds have been realized by the mechanism shown in the accompanying drawings in which the same reference numerals refer to the same parts throughout the several figures and in which,

Fig. 1 is a vertical section through the printing mechanism,

Fig. 2 is a detail of the type bar restoring mechanism,

Fig. 3 is a section taken on line 3—3 of Fig. 1, and

Fig. 4 is an elevation taken along line 4—4 of Fig. 3.

The operation of the printing mechanism generally and the listing and totaling control is well understood and fully described in the copending application referred to. It will therefore be very briefly described in the present case.

Referring to Fig. 1, the type bars of the machine are shown at 51 carrying a plurality of type 52 in the casing at their upper end and are slidably mounted in the frame 53 which in turn is mounted for vertical reciprocatory motion. The frame 53 is reciprocated through an arm 54 connected to it through links 55. The arm 54 is fixed on a shaft 56 which may be rocked either from a total shaft 60 or a list shaft 61. It will be understood that during the listing operations, that is during the printing of successive items, the shaft 61 rotates, while during the total printing the shaft 60 rotates, each shaft being stationary when the other is rotating. The shaft 56 has a double arm member 62 fixed to it. One arm of this member carries a set screw 63 which coacts

with a lug on arm 64 freely mounted on shaft 56. The other arm of member 62 carries a lug which coacts with a set screw 65 on arm 66 also freely mounted on shaft 56. Arm 64 carries a roller at its end which coacts with a cam 70 on total shaft 60, while arm 66 carries a roller at its end engaging in the usual groove in listing box cam 71 fixed to list shaft 61.

When the listing shaft 61 is rotating the consequent movement of arm 66 causes the set screw 65 to rock member 62 clockwise thus rocking shaft 56 which through arm 54 raises frame 53. During operation of the total shaft 60, cam 67 oscillates arm 64 which likewise rocks shaft 56 through arm 64. The frame 53 is restored to home position by gravity assisted by a spring 68.

The type bars 51 are provided with an extension 75 at the lower end which engages under a part of the frame 53. A spring operated lever 76 mounted on a bracket 77 fastened to frame 53 forces the extension 75 on each type bar resiliently against the frame 53 so that the type bars tend to rise with the frame. Each type bar is provided with a rack 80 having a tooth for each type 52. A pawl 81 is normally latched by dog 82 to hold it out of the path of teeth 80. On energization of a corresponding printing control magnet 83 to attract its armature 84 a call wire 85 is moved to the right in Fig. 1, to disengage dog 82 from pawl 81, whereupon the latter engages one of the teeth in rack 80 to stop further motion of the type bar. The frame, of course, continues its upward movement, spring operated lever 76 yielding to permit this relative displacement between the type bar 51 and the frame 53. The energizations of the magnets 83 are timed according to index point perforations on controlling records in listing and from the setting of accumulating wheels in total printing in the usual manner. At the end of the upward stroke of frame 53 printing hammers 81' are operated to strike the selected type to effect printing on a suitable platen 90. The hammers are operated by bail 91 pivoted at 92 and urged counterclockwise by spring 93. An arm 94 pivoted on arm 54 moves the bail 91 clockwise as the arm 54 rises to tension spring 93. At the end of the upward stroke of the frame arm 94 releases the bail 91 which thereupon is actuated by the spring 93 to effect a printing blow of the hammers 89. This mechanism is well understood and need not be further described.

The latch 81 through which the movement of type bar 51 is arrested must be restored to latching position at the end of each printing cycle. Formerly this was effected by a cam surface on the rack 80 requiring additional movement of the type bar 51. According to the present invention this extra movement is obviated and the latch is positively restored through a bail 98 pivoted at 99 and oscillated

after each printing operation by a member 100 freely mounted on shaft 56 and impinging member 96 rigid with bail 98. The member 100 is provided with an arm 101 coacting with cam 102 on list shaft 61 and an arm 103 coacting with cam 104 on shaft 105 which is geared directly to the total shaft 60. Toward the end of each printing operation either cam 102 or 104 coacting with its respective arm 101 or 103 rocks the member 100 forcing the bail 98 upward to remove all pawls 81 from engagement with the racks 80 and restore them to position to be latched by dog 82. The spring 108 interconnecting pawl 81 and dog 82 tends to restore the dog to latching position but additional mechanism is provided to positively restore it if the spring does not do so, this additional mechanism also serving to positively release the armatures 84 of the printing magnets 83. An arm 109 fixed to shaft 99 which rocks with the bail 98 engages an arm 110 fast to shaft 111 and rocks the latter clockwise. A bail 112 carried by suitable arms fixed to the shaft 111 thereupon moves to the left in Fig. 1 and forces dog 82 into latching position shortly after the bail 98 has restored the latch 81. This movement of the dog 82 through call rod 85 also positively moves the armature 84 away from its magnet 83.

Owing to the loose connection between the printing frame 53 and the other machine elements, which consist of the arms 64 and 66 cooperating with a double arm member 62, there is a tendency for the frame 53 in its downward movement to lag behind the other machine elements. Consequently there is a tendency for the arm 54 to be picked up with a jerk from the listing mechanism on the next cycle before it has come to rest in its lowermost position. According to the present invention provision is made for positively restoring the frame to its lowermost position just prior to the end of the printing cycle. This mechanism is shown in Figs. 1 and 2.

An arm 115 is fast to the shaft 56 on which arm 54 is also mounted. A second arm 116 is freely mounted on shaft 56 and a slot 117 therein coacts with a pin 118 on arm 115 thus permitting limited relative movement between the arms 115 and 116. A spring 120 normally forces the arms 115 and 116 apart. Just before the frame 53 reaches its uppermost position on listing a cam 121 on list shaft 61 engages arm 116 and forces it to the left in Fig. 2 compressing spring 120 which thereupon resiliently but firmly tends to rotate arm 115 and shaft 56 counterclockwise thereby holding the lug on member 62 firmly against the set screw 65. The frame 53 on its downward movement is thus held in step with the other machine elements and reaches lowermost position when the latter reach home position. A slight additional movement of the shaft 62 after the printing mechanism

reaches home position, permitted by a concentric portion of the groove in cam 71, causes the extension of cam 121 to free arm 116 as shown in Fig. 1 so that the spring 120 is not under

compression when the machine is at rest. The provision of the spring 120 with the scissors mechanism formed by the arms 115 and 116 provides a booster device to effect the return of frame 53 to home position positively but without shock. Thus at the end of each listing cycle the frame 53 is brought to rest in its lowermost position in readiness to be again picked up by either the listing or total printing mechanism in the following cycle without undue shock to the mechanism.

The invention has now been described in connection with a single operative embodiment and it will be obvious that modifications will readily suggest themselves to those skilled in the art and it is intended to be limited only as indicated by the scope of the following claims.

We claim:

1. A printing mechanism for a tabulating machine which is provided with listing and totaling mechanism, comprising a type bar having a plurality of type mounted thereon, means for moving said type bar to bring said type successively into printing position on either a listing or totaling operation, a pawl for selectively arresting said type bar with its different type in printing position, means for holding said pawl inoperative and means controlled by the listing and totaling mechanism for releasing the same at different times to select different type and means operated by both said listing and totaling mechanisms for restoring said pawl to latching position after a type selecting operation.

2. A printing mechanism comprising a type bar having a plurality of type mounted thereon, driving means for moving said type bar to bring said type successively into printing position, means for arresting said bar with its different type in printing position, an electromagnet having an armature for controlling said last named means and means operated by said driving means for positively restoring said armature after a controlling operation thereby.

3. A printing mechanism comprising a type bar having a plurality of type mounted thereon, driving means for moving said bar to bring said type successively into printing position, a pawl for selectively arresting said type bar with its different type in printing position, means for holding said pawl inoperative and an electromagnet having an armature for releasing said last named means to select the different type and means operated by said driving means for positively restoring said pawl to latching position and said armature to normal inoperative position after an operation thereof.

4. In an accounting machine, accounting

mechanism, printing mechanism comprising a reciprocatory member for operating type elements, means for driving said reciprocatory member positively with said accounting mechanism on its forward stroke and in floating relationship thereto on its return stroke and means operated by the accounting mechanism for taking up lag between the accounting mechanism and the reciprocatory member towards the end of its return stroke.

5. In an accounting machine, accounting mechanism, printing mechanism comprising a reciprocatory member for operating type elements, means for driving said reciprocatory member positively with said accounting mechanism on its forward stroke and in floating relationship thereto on its return stroke and means operated by the accounting mechanism for positively driving the reciprocatory member at the end of its return stroke to bring it to home position in step with the accounting mechanism.

6. In an accounting machine, accounting mechanism, printing mechanism comprising a reciprocatory member for operating type elements, means for driving said reciprocatory member positively with said accounting mechanism on its forward stroke and in floating relationship thereto on its return stroke and a booster device operated by said accounting mechanism for bringing the reciprocatory member into step with the accounting mechanism toward the end of its return stroke.

7. In an accounting machine, accounting mechanism, printing mechanism comprising a reciprocatory member for operating type elements, means for driving said reciprocatory member positively with said accounting mechanism on its forward stroke and in floating relationship thereto on its return stroke and a resilient driving connection between the reciprocatory member and the accounting mechanism to bring the member to home position on its return stroke in step with the accounting mechanism.

8. In an accounting machine, accounting mechanism and an operating shaft for the same, printing mechanism comprising a reciprocatory member for operating type elements, means for driving said reciprocatory member positively with said accounting mechanism on its forward stroke and in floating relationship thereto on its return stroke, a spring operated device for positively driving said reciprocatory member towards the end of its return stroke to bring it in step with the accounting mechanism and means operated by said shaft for tensioning said spring prior to the end of the return stroke.

9. In an accounting machine, accounting mechanism and an operating shaft for the same, printing mechanism comprising a reciprocatory member for operating type elements, means for driving said reciprocatory member

positively with said accounting mechanism
on its forward stroke and in floating relation-
ship thereto on its return stroke, said driving
means including an arm reciprocated by said
5 shaft, a second arm movable with respect to
the first named arm and a spring interposed
between the two arms and a cam on said shaft
cooperating with said second arm to tension
said spring towards the end of the return
10 stroke of said member to positively drive the
latter to home position.

In testimony whereof we hereto affix our
signatures.

GEORGE F. DALY.
RALPH E. PAGE.

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