Aug. 2, 1938. W. TOBIAS 2,125,826

TYPEWRITER

Filed Dec. 23, 1935 2 Sheets-Sheet 1

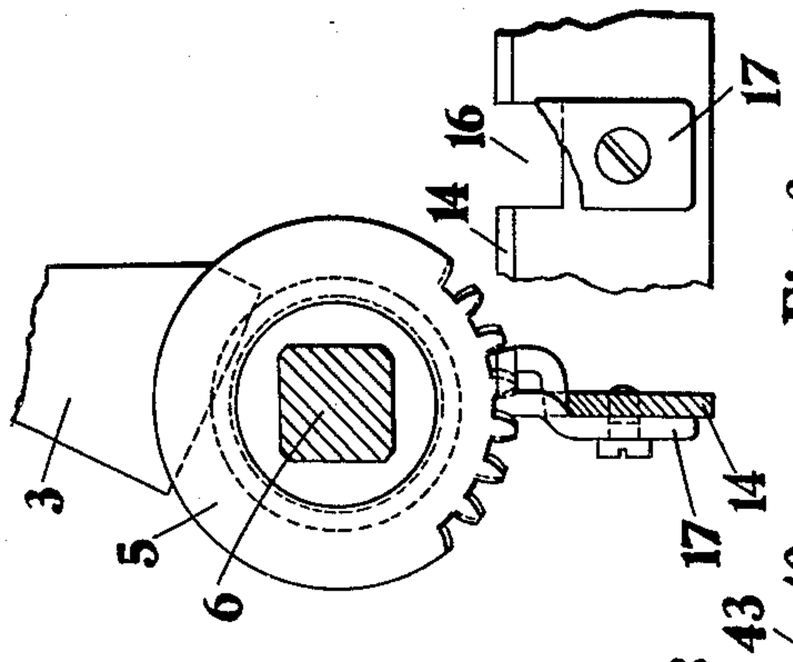
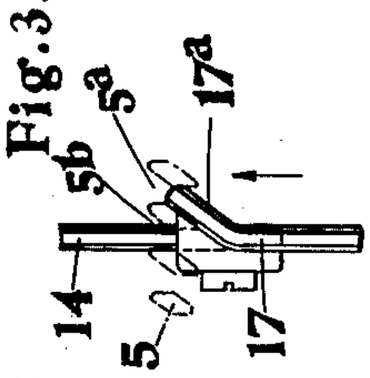


Fig. 3.



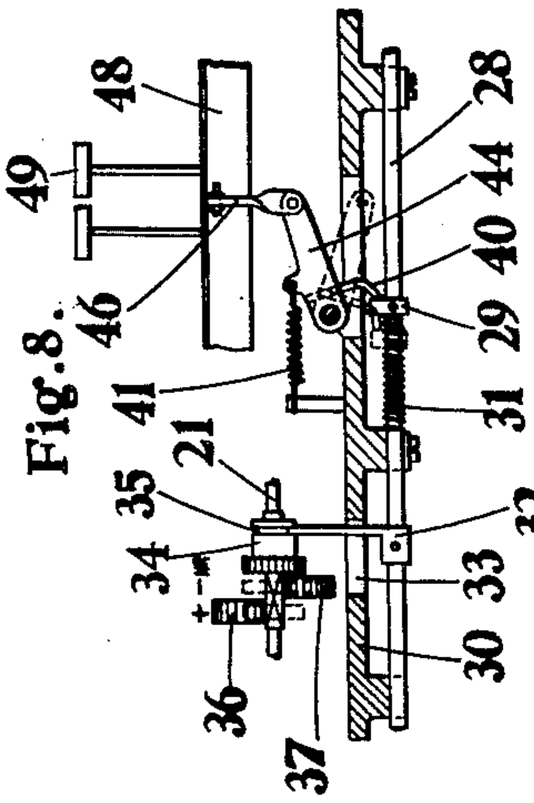


Fig. 8.

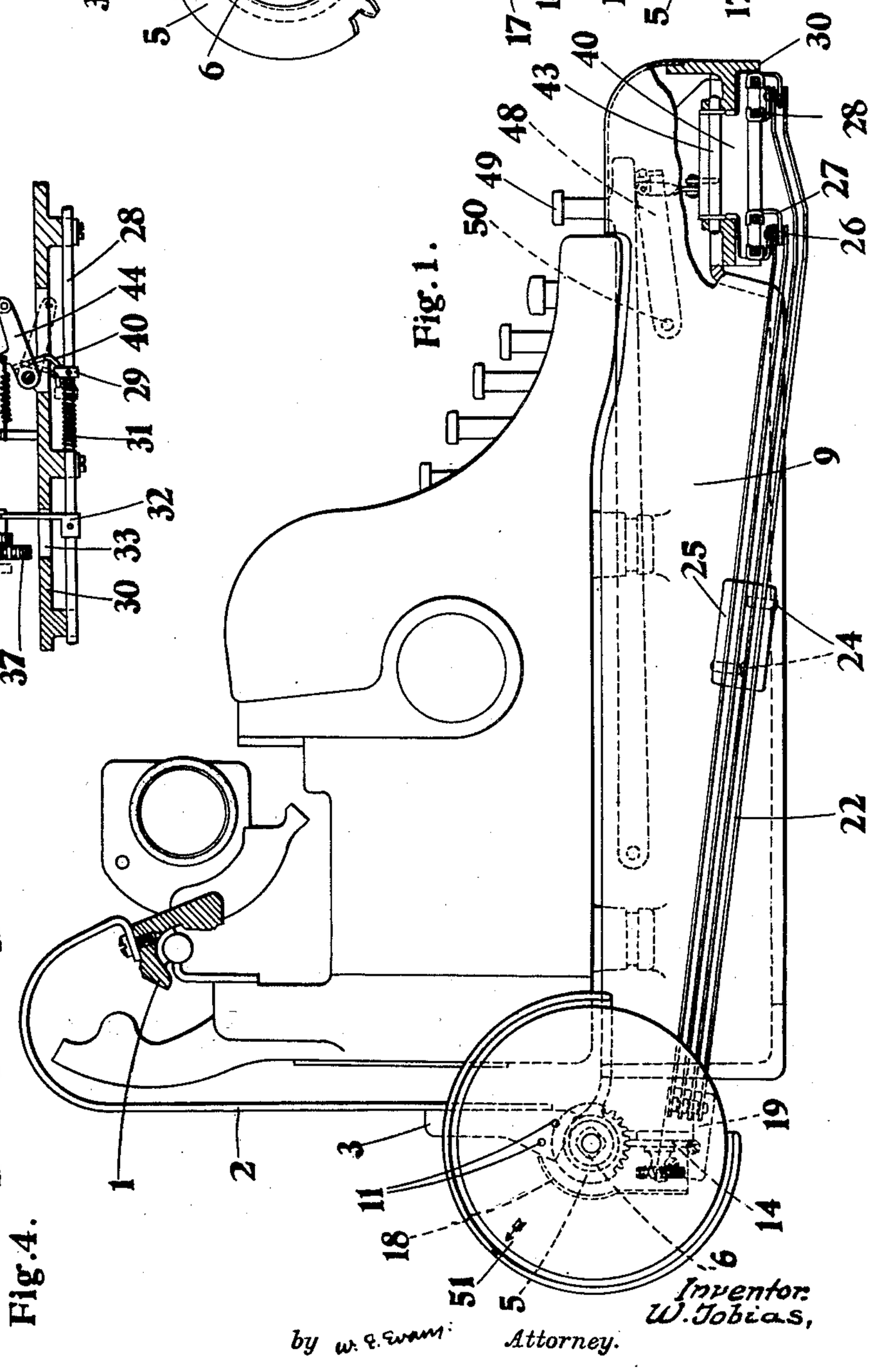


Fig. 1.

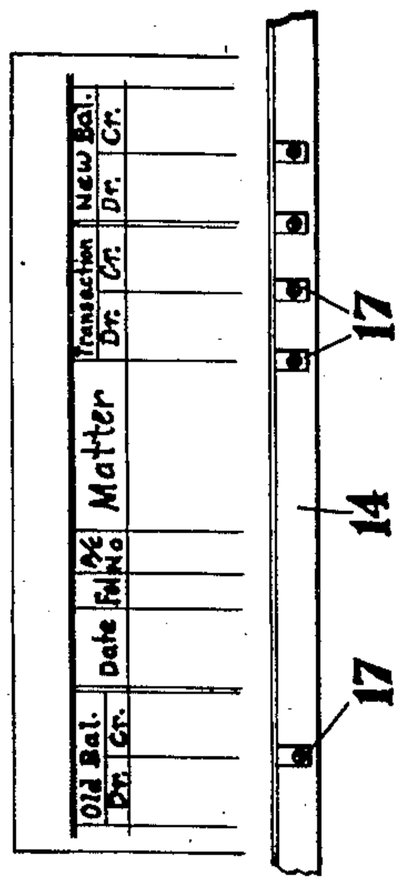


Fig. 4.

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TYPEWRITER

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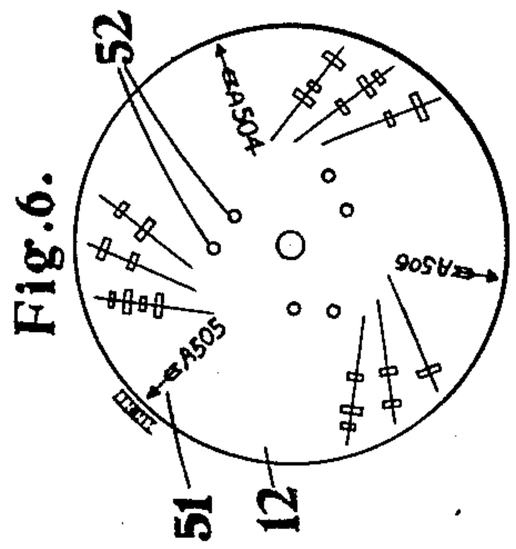

Fig.6.

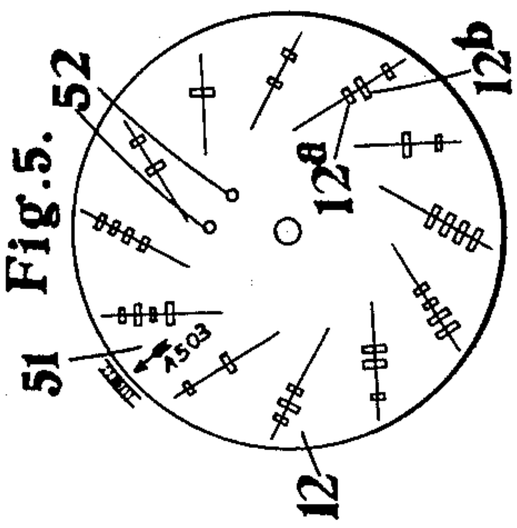

Fig.5.

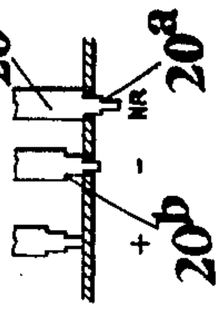

Fig.7.

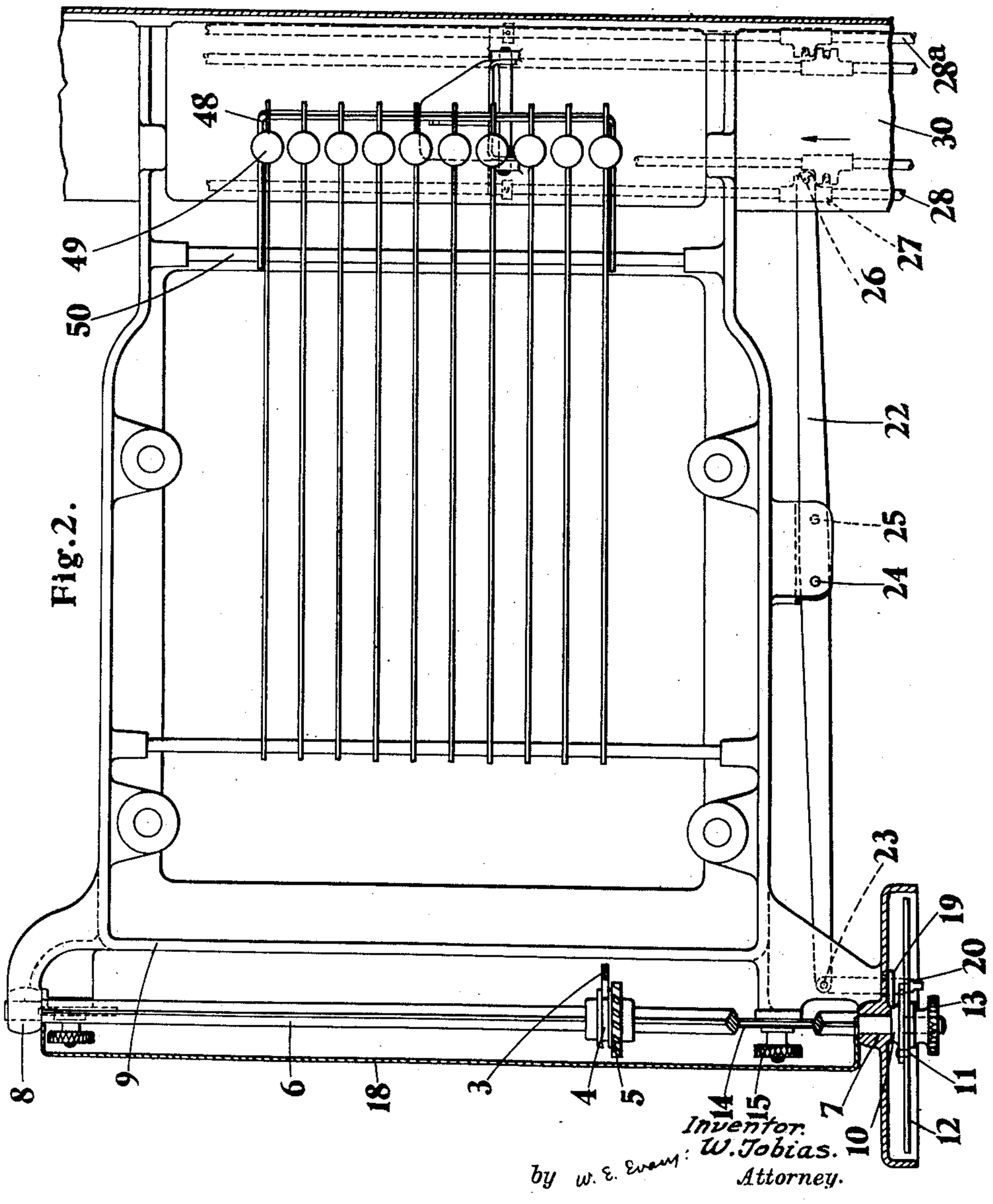

Fig.2.

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UNITED STATES PATENT OFFICE

2,125,826

TYPEWRITER

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Application December 23, 1935, Serial No. 55,793
In Germany February 8, 1934

6 Claims. (Cl. 235—59)

The invention relates to calculating typewriters provided with fixed totalizing mechanisms, in which the entire calculating mechanism including the totalizing mechanisms is located in a casing separately from the body of the typewriter, the casing serving as a stand for the typewriter. Hitherto, the controlling movement for the totalizing mechanisms of such machines has been effected by adjustable riders mounted on the paper carriage or by interchangeable stop rails, the movement being transmitted to the calculating mechanism by a system of rods. The number of rod connections on the typewriter increases with the number of the totalizing mechanisms and with the devices acting in coordination with the totalizing mechanisms.

The problem of the invention is to establish between the typewriter part and the calculator part an at all times dissoluble connection consisting of a single member and suitable for a number of totalizing mechanisms, so that except for the attachment of a connecting member to the typewriter carriage, no alterations or additions are necessary on the typewriter for the purpose of controlling the totalizing mechanisms.

The invention is applicable to machines of the kind described in Patent No. 1,776,800, but is not confined to such application.

According to the invention the desired result is secured by providing a pinion to slide under the action of a single driver along a spindle mounted on the calculator part in accordance with the movements of the paper carriage, the pinion being rotated with the spindle at prescribed positions, a suitable guide rail; this rotational movement is transmitted by the spindle to a control plate for automatically controlling the totalizing mechanisms.

The control plate is preferably provided as a templet and the rods actuating the totalizing mechanism are fitted with feeler pins which derive the setting position from the templet. Templets and control plates are known in connection with calculating machines but not with the mechanism hereinbefore described.

The invention is diagrammatically illustrated, by way of example, in the accompanying drawings, in which:

Figure 1 is a side elevation of the machine, all the parts not required for the understanding of the invention being omitted.

Figure 2 is a plan of the under portion of the machine, the typewriter portion being removed.

Figure 3 shows the sliding pinion on an enlarged scale, with three views of the guide rail.

Figure 4 is a comparative of a form and of the corresponding guide rail.

Figures 5 and 6 represent two different templets.

Figure 7 shows the engagement of the feeler pins in the templet, and

Figure 8 is a section through the base-plate of the calculating machine with the actuating rods.

Secured to the frame of the typewriter carriage 1 (Figure 1) is a connector 2 which extends downwardly beyond the rear part of the machine and terminates at its lower end in a flat member or driver 3 engaging in an annular groove 4 (Figure 2) of the pinion 5. The pinion 5 is slidably mounted on a spindle—here shown as a squared spindle 6—so that it is constrained to follow all the movements of the paper carriage 1. The spindle 6 is rotatably mounted in two bearing eyes 7 and 8 on the lower casing 9 of the machine, which also houses the rest of the calculating mechanism. On the casing 9 below the spindle 6 and parallel therewith is also secured a rail 14 having a chamfered edge directed towards the centre of the spindle and fitting closely into the teeth of the pinion 5, which it restrains from rotation so long as this straight line guidance remains. In order to enable the pinion 5 and thus the spindle 6 to set the calculating mechanism into operation in known manner by means of cams, rods and the like, the rail 14 is provided with tooth-like cams which may—as shown in Figure 3—be formed as separate members 17 of identical form, fitted in corresponding recesses 16 in the rail 14. In order to obtain proper sliding contact—and not merely point contact—surfaces, the pinion 5 is preferably formed as a worm wheel, and the cams are formed with sloping surfaces to correspond with the inclined teeth of the pinion 5. The offset end of the cam is displaced exactly to the circular pitch of the teeth of the pinion, so that after the offset portion 17*a* of the cam has been traversed, the rail 14 which subsequently acts as a guide once more bears against the flattened parts of the worm wheel on both sides of the tooth space as shown in Figure 3. The guide rail 14 also projects a little beyond the offset end of the cam 17 so that for a short distance both guide members are in operation, as at 5*a* and 5*b*, and can also ensure that a rapid transition shall not cause overspeeding. The cams 17 are provided at all desired operating positions and the rail 14 together with the cams are interchangeably provided, being

secured in this case for example by knurled nuts 15 (Figure 2). Figure 4 clearly shows the juxtaposition of a printed form and the corresponding guide rail 14, so that a cam contour 17 is provided at each change over to another calculation column. The first column (old balance, debit) is determined by a basic setting of the reversing wheels of the calculating mechanism. The parts are protected against damage and dirt for the full travel of the worm pinion by a cover plate 18 (Figure 1).

The further transmission of the control movement from the driver member 3, and the spindle 6, to the operative wheels of the calculating mechanism is effected not as heretofore by means of cams and rod connections but by means of a perforated templet (Figures 5 and 6), here shown by way of example as a circular plate 12. The plate 12 bears (Figure 2) against a transmission ring 10 mounted on the spindle 6 and is set and secured in the correct position by means of two pins 11 and the milled nut 13. The templet 12 is provided with variously disposed holes (Figures 5 and 6) engaged by feeler pins 20 (Figure 2). The pins 20 are slidably mounted in a plate 19 on the member 7 of the casing so as to be movable towards and away from the templet 12 and are articulated at their rear end on the long transmission levers 22 by means of pins 23. The levers 22 are pivotally mounted on the pins 24 in a slotted member 25 at the side of the casing 9 and in turn engage with transversely disposed push bars 28, 28*a* suitably mounted in the front part of the casing, in such a manner that in accordance with the depth to which the pins 20 penetrate into the holes in the templet, the bars 28 and 28*a*—and with them the operative wheels of the calculating mechanism, as will be hereinafter described—are correspondingly moved. The connection between the push bars 28, 28*a*, and the levers 22 is established by means of heads 27, in the slots of which engage the pins 26 secured to the ends of the respective levers. The distance between the pivotal pins 24 and the pins 20 is not the same for all in order to obtain the same operative strokes with the push bars 28 and 28*a* disposed at different distances. In order to utilize the pin 20 for several key positions its width is stepped in several stages 20*a* and 20*b* (Figure 7) corresponding to the differing dimensions of the holes 12*a*, 12*b* of the templet 12 (Figures 5 and 6). In this way, three different positions of engagement of the templet are obtained, as will be clear from Figure 7. A perforation symbol is therefore provided, on the templet 12, for each setting rendered possible by the pitch of the teeth of the worm pinion, and the desired operative connections are marked out in the order in which they are to be applied. To facilitate the selection and interchanging of the templets they are provided with markings, (the narrow 51 in Figures 5 and 6) on the rim, which markings must be set opposite a corresponding marking on the casing when the paper carriage is in its extreme right-hand position. The additional holes 52 in the templet are disposed in accordance with the setting pins 11 hereinbefore referred to and at different distances from the central axis so as to make it impossible for the templet to be mounted with the reverse side to the ring 10.

It will be understood that the holes and symbols for a number of smaller operations may be combined on a single templet and with this object in view several markings indicating the corresponding printed forms are provided as shown in Figure 6.

The three positions in which the feeler pins can be set correspond to the three positions of the usual simple reversing mechanism shown in Figure 8. The member 21 is the spindle that extends throughout the calculating mechanism (not shown in this figure). It is provided of square section to carry the actual change pinion 34, which is moved by means of a driver member 32 secured to the push bar 28 and engaging in the annular groove 35 in the pinion 34, the member 32 passing through a gap 33 in the base plate 30 (which may be integral with the lower casing 9) of the calculating machine. The indicated position of the pinion 34 is the non-calculating position, whereas when in the two positions indicated by the intermediate pinions 36 and 37, the wheel transmits the subtracting or adding rotational movement to the spindle (not shown) driving the adding mechanism which is disposed to the rear. It will be understood that in the converse case, the spindle 21 can also serve to actuate the totalizing mechanism, and the two pinions 36 and 37 be connected to the spindle of the calculating mechanism without any change in the operative conditions. An operative-pinion mechanism of this kind with a push bar 28 is provided for each independently operated totalizer. The pressure of a spring 31 against the adjusting ring 29 forces each push bar in the direction in which the feeler pin 20 tends to penetrate the holes of the templet 12.

The withdrawal of the feeler pins 20 out of the holes in the templet 12 is effected by an added movement produced in this case, for example, by depressing one of the decimal tabulator keys 49 of the typewriter. The ordinary arrangement of the typewriter tabulator device is assumed to be known, and is therefore not described and illustrated. In the calculating typewriter an angular member 48 mounted to rock on the spindle 50 (Figure 1) extends beneath all the tabulator levers (Figure 2). At about the mid-position of the front part of the angular member a link 46 is suspended which connects it with the outer end of a double lever 44 (Figure 8). The lever 44 is mounted on the base plate 30 and carries an arm 40 which is bent downwards at right angles and is of such a width that it engages over all the adjusting rings 29 of the push bars 28, 28*a*. A tension spring 41 tends to urge all the mechanism 48, 46, 44, 40 into a neutral position in which the upper edge of the angular member 48 bears lightly against the lower edges of all the tabulator levers 49 whilst at the same time the cranked arm 40 is in contact with the free surface of the rings 29 as shown in Figure 8. Consequently depressing any of the tabulator keys causes the angular member 48 to swing downwards and so to press the rod mechanism against the action of the springs 31. It neutralizes the action of the springs and by means of the adjusting rings forces the push bars 28, 28*a* and the operative rods 22 and the feeler pins 20 back into the original position. The templet is thereby released and the paper carriage can at the same time spring into the position set for it by the action of the tabulator stop. A release key, for example, similar to that provided for the return of the carriage, may also be provided for the release of the feeler pins whenever required.

After the general preparations have been made for all entries of the same kind by inserting or exchanging the templet 12, and the carriage of the

typewriter is in position on the extreme right, the whole calculating operation proceeds in the following manner:

In order to reach the first calculating column—for example the "debit column, old balance" on the form shown in Figure 4—the tabulator key corresponding to the decimal position is struck. By means of the attached rod mechanism 46, 44, 40 the angular member 48 presses the adjusting rings 29, the push bars 28, 28*a* and operative rods 22 out of their position, and thereby draws the feeler pins 20 out of the holes in the templet 12. At the instant the tabulator key is fully depressed, the paper carriage travels without any restriction and without turning the worm pinion out of the position occupied up to the first tabulator stop. On the tabulator key being released the feeler pins accompanied by the rod mechanism drawn back by the springs 31 and 41, move forward and drop into their allotted holes in the templet. Where there are no holes, the feeler pins rest on the surface of the templet—the "addition" position—whilst where they encounter holes they penetrate into the templet as far as the shoulders 20*a* or 20*b* and assume the position for subtraction or non-calculation. According to requirements those parts of the templet where there are not holes may be selected as representing the non-calculating position by suitably arranging the shift pinions 34, 36 and 37 shown in Figure 8 with their sequence in the axial direction changed. By the action of the rod mechanism 20, 22, 28, 28*a*, 32 all the shift wheels 34 are brought into the corresponding concordant operative positions, which they retain throughout the carrying out of the calculation.

When it is desired to pass to the next column—the "credit column, old balance"—the corresponding tabulator key is depressed. The feeler pins withdraw from the templet at once in the manner hereinbefore described. When the key is right down the carriage is again free to move. The worm pinion turns through the distance of one tooth as the result of being traversed along the adjacent cam 17 by the action of the connector 2 and driver 3. This rotation is transmitted to the spindle 6 and from the latter to the templet 12. The templet 12 is moved into the next position, determined by the travel of the worm pinion on the straight section of the guide rail 14, and on the tabulator key being released the feeler pins 20 again engage in accordance with the particular setting of the calculating wheels. At each new tabulated setting therefore the feeler pins withdraw, allow free passage to the carriage and then by penetrating the templet set the wheels of the calculating mechanism. The movement of the carriage thus merely turns the worm pinion 5 with the attached templet 12 and is practically unaffected by a resistance set up in operating the mechanism.

Any positions that are to be left blank in tabulating can be skipped by again tapping the tabulator key. Moreover, an interchange of the guide rail for the worm wheel is not necessarily entailed by a change in the printed forms employed. On the contrary the full width of the writing space in the sections concerned can be allocated to the positions that are operative. It will however be understood that in the case of such positions as are not required for the work in hand no holes will be provided in the templet.

The mechanism according to the invention may be employed universally with all types of typewriter provided with tabulator keys, since only a single connection represented by the connector 2 is necessary between the paper carriage of the machine and the mechanism according to the invention. The connector 2 may be of a shape to accord with the design of the particular machine. The nature of the calculating unit is of no importance. As an example of machine to which the invention may be applied reference may be made to the Patent No. 1,776,800 before referred to. In the machine as therein described it is sufficient to provide two feeler stations 22/28, whereas the drawings accompanying the present specification show four feeler stations 22/28, that is to say, for four shift positions or for four stationary counting mechanisms. The two shift positions in the construction according to the specification referred to would replace the hand-actuated control there provided and represented by 22*a* and 22*b* of Figure 4. Thus the slider 15 operated by the keys 11 Nos. 1 to 9 move by way of bevel wheels the spindle 21 shown in Figure 8 of the drawings accompanying the present specification. According as the intermediate pinion 34 is moved by the device of the invention so it rotates the counting mechanism driving spindle by means of the toothed wheel 36 directly for adding or by way of the interposed wheel 37 in the opposite direction for subtracting. In the position shown in Figure 8 of the drawings accompanying the present specification the teeth of the wheel 34 are shown out of engagement with the teeth of both the wheels 36 and 37. The driving spindle cannot therefore be rotated and the totalizing mechanism is disconnected in the non-calculating position. The toothed wheel 36 would thus have to be mounted in the construction according to the prior specification in the place of the bevel wheel 27 of Figure 16 or of the bevel wheel 27' of Figure 16*a*. Thus, for each totalizing mechanism driving spindle in the prior construction, that is to say, 28*a* and 28*a*' there is assigned a set of pinions 34, 36 and 37 as shown in Figure 8 of the drawings of the present specification and to each set of these pinions there corresponds a rod controlled by the perforated templet.

The invention is applicable to all kinds of totalizing mechanisms according as the conditions of design and the operable steps will allow. It is particularly suitable for application to power driven totalizing or calculating mechanism. The movement of rotation for the calculating operation requires in all cases to be transmitted to the spindle 21, while the wheel or pinion 36 requires to be mounted in all cases on the driving spindle or actuator of the totalizing mechanism.

I claim:

1. A control device for the totalizing mechanisms of calculating typewriters, comprising a control element, transmission mechanism operated from the control element for setting the state control mechanism of the totalizing mechanism, a spindle upon which the control element is mounted, a pinion that is slidably but non-rotatably mounted upon the said spindle, a driving element engaging the said pinion and moving it upon the spindle in accordance with the change of position of the typewriter platen carriage and a guide rail extending parallel with the spindle, the said guide rail being provided at determined intervals with means for rotating the pinion through a determined angular space as the pinion moves axially.

2. A control device for the totalizing mechanism of calculating typewriters, comprising a con-

trol templet, a spindle upon which the said templet is set, a pinion that is slidably but non-rotatably mounted upon the said spindle, a driving element engaging the said pinion and moving it along the spindle in accordance with the changes of position of the typewriter platen carriage, a guide rail extending parallel with the spindle, the said guide rail being provided at determined intervals with means for rotating the pinion through a determined angular space as the pinion moves axially, for the rotation of the spindle to effect angular adjustment of the templet, and feeler elements bearing upon the templet and respectively coupled to the selecting elements of the totalizing mechanisms by which the state of the said mechanisms is determined, the said feeler elements being set into their required operative positions by the templet.

3. A control device for the totalizing mechanisms of calculating typewriters, comprising a control templet having therein a number of groups of holes, in which groups the number and dispositions of the holes may vary from group to group, pinions in each totalizing mechanism relatively adjustable for determining the state of the corresponding totalizing mechanism, a movable adjusting element for each totalizing mechanism for effecting the required adjustment of the said pinions, a feeler pin for actuating each of said adjusting elements, the said feeler pins bearing upon the templet and being constrained to enter corresponding holes in one of the groups of holes of the templet for the required state control setting of the totalizing mechanisms, a spindle upon which the said templet is set, a pinion that is slidable but non-rotatably mounted upon the said spindle, a driving element engaging the said pinion and moving it along the spindle in accordance with the changes of position of the typewriter platen carriage, and a guide rail extending parallel with the spindle, the said guide rail being provided at determined intervals with means for rotating the pinion through a determined angular space as the pinion moves axially, for the rotation of the spindle to effect angular adjustment of the templet to bring a group of holes in the said templet opposite to the feeler pins.

4. A control device for the totalizing mechanisms of calculating typewriters according to claim 3, having springs acting upon the adjusting elements to move them into an inoperative position and to press the feeler pins upon the templet, a plurality of tabulator keys, a rocking element moved in common by the said tabulator keys, and a releasing element operated by the said rocking element to move the adjusting elements against the action of their respective springs and to withdraw the feeler pins from engagement with the templet.

5. A control device for the totalizing mechanisms of calculating typewriters according to claim 3, having the slidably and non-rotatably mounted pinion formed as a worm wheel of small width and with teeth which have their surfaces formed with sloping parts inclined to the plane of the wheel and with parts which are parallel with the axis of the wheel and having the guide rail provided at intervals with removable cam elements that interrupt the operative edge of the guide rail and are offset for the purpose of engaging the sloping part of a tooth of the pinion and rotating the pinion, the teeth of the pinion being provided with flat surfaces which engage the guide rail up to the moment of engagement of the sloping part of a tooth with a cam element.

6. A control device for the totalizing mechanisms of calculating typewriters according to claim 3, in which the feeler pins have the operative ends stepped in dimensions and the holes in the templet are provided of correspondingly differing widths according to the extent of entry of the feeler pin into the templet that is required for the particular setting of the adjusting member of a determined totalizing mechanism so that the position of the said feeler pins may result in the setting of the totalizing mechanisms for no calculation or for addition or for subtraction.

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