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A. F. POTT

CALCULATING MACHINES, CASH REGISTERS OR THE LIKE

Filed Dec. 29, 1937

Serial No.

182,336

16 Sheets-Sheet 1

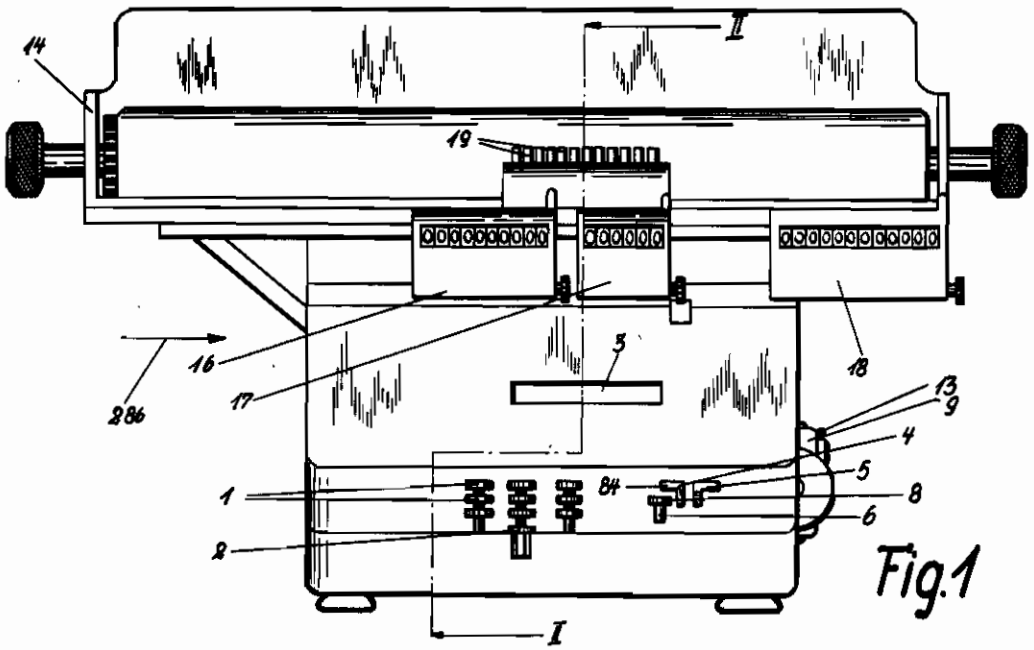
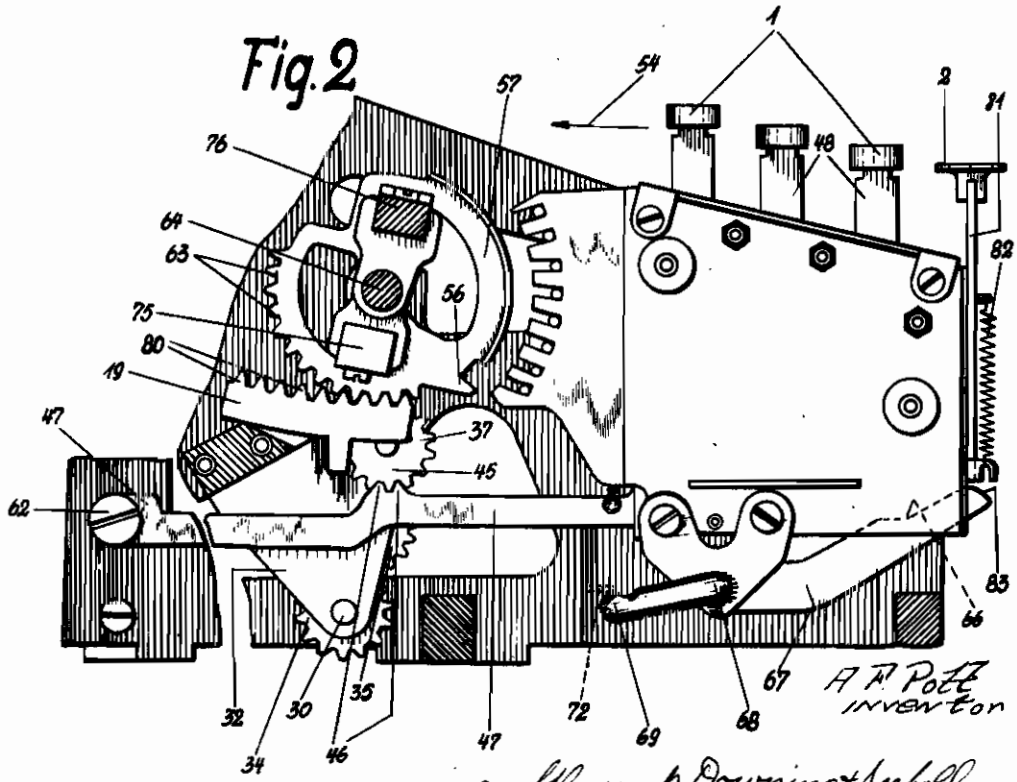


Fig.1

Fig.2



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CALCULATING MACHINES, CASH REGISTERS OR THE LIKE
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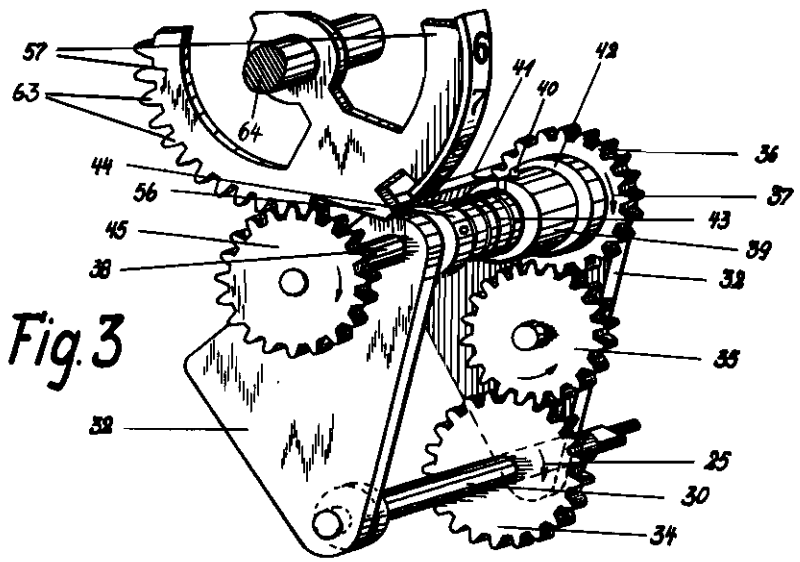
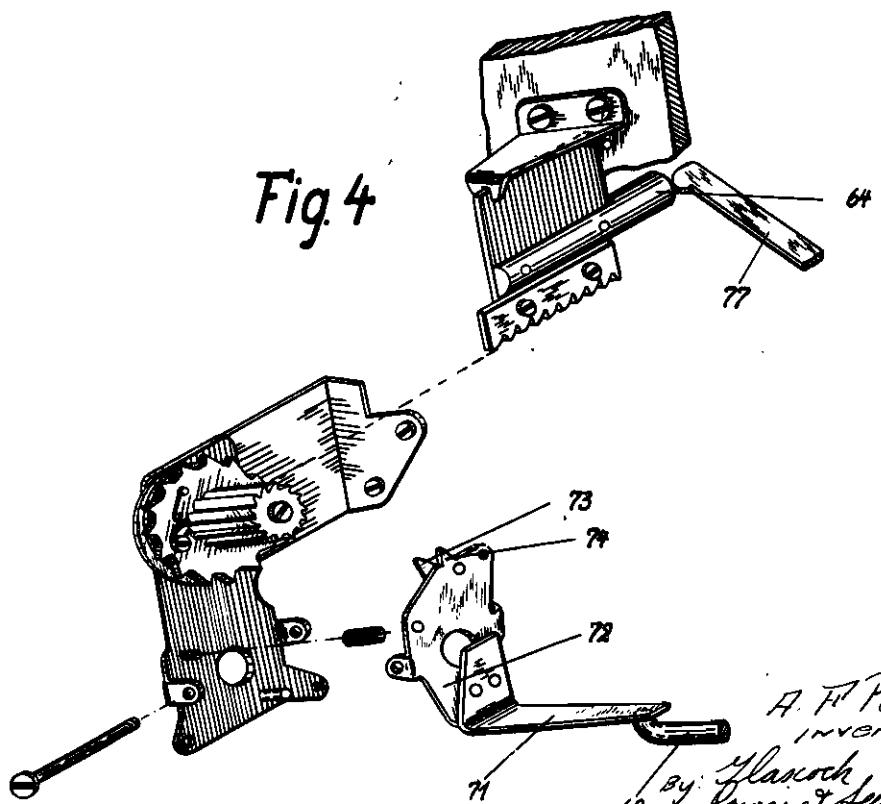


Fig. 3

Fig. 4



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182,336
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Fig.5

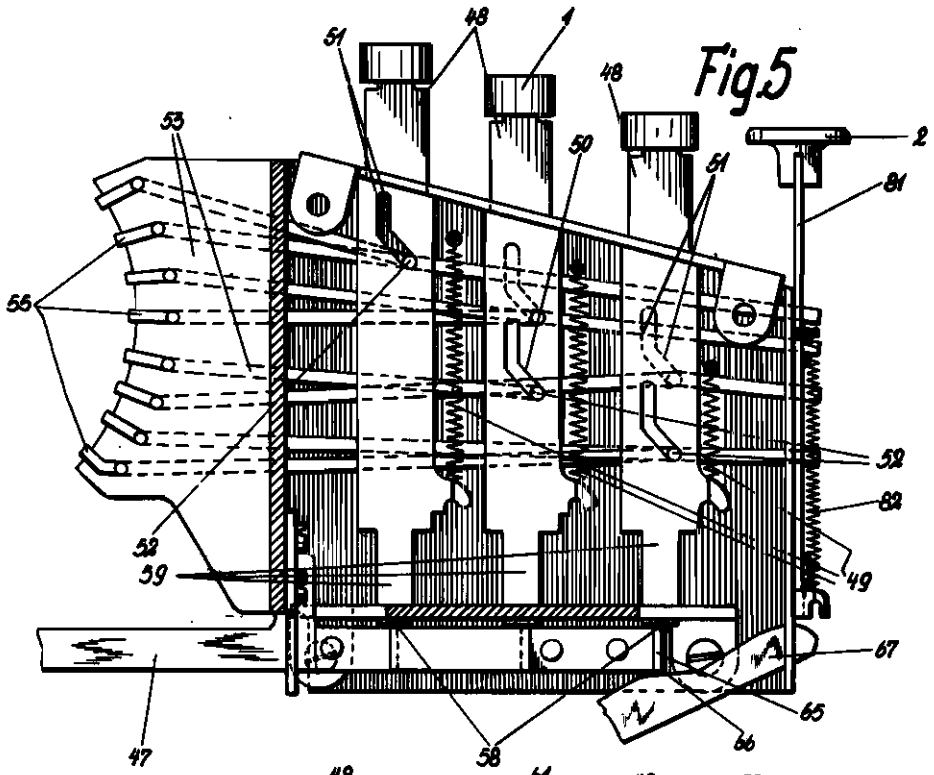
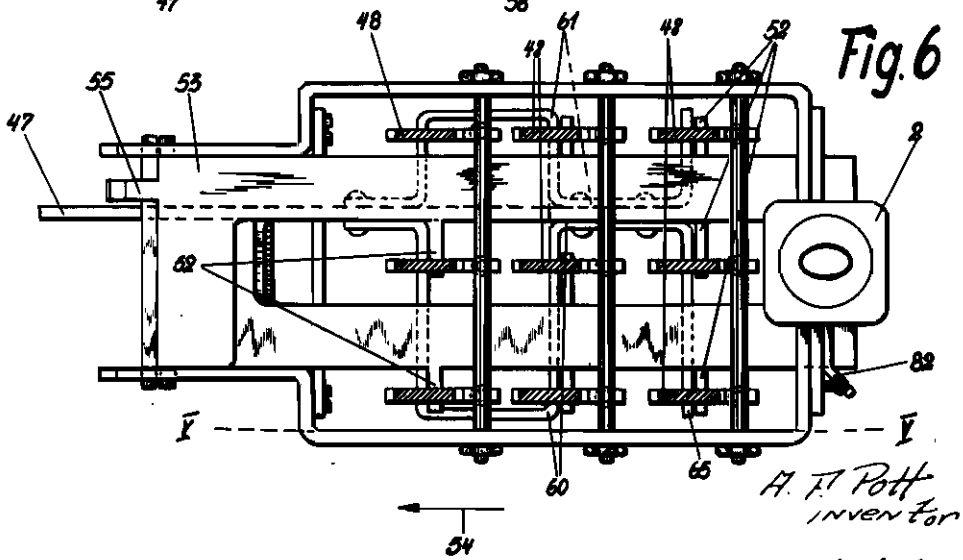


Fig.6



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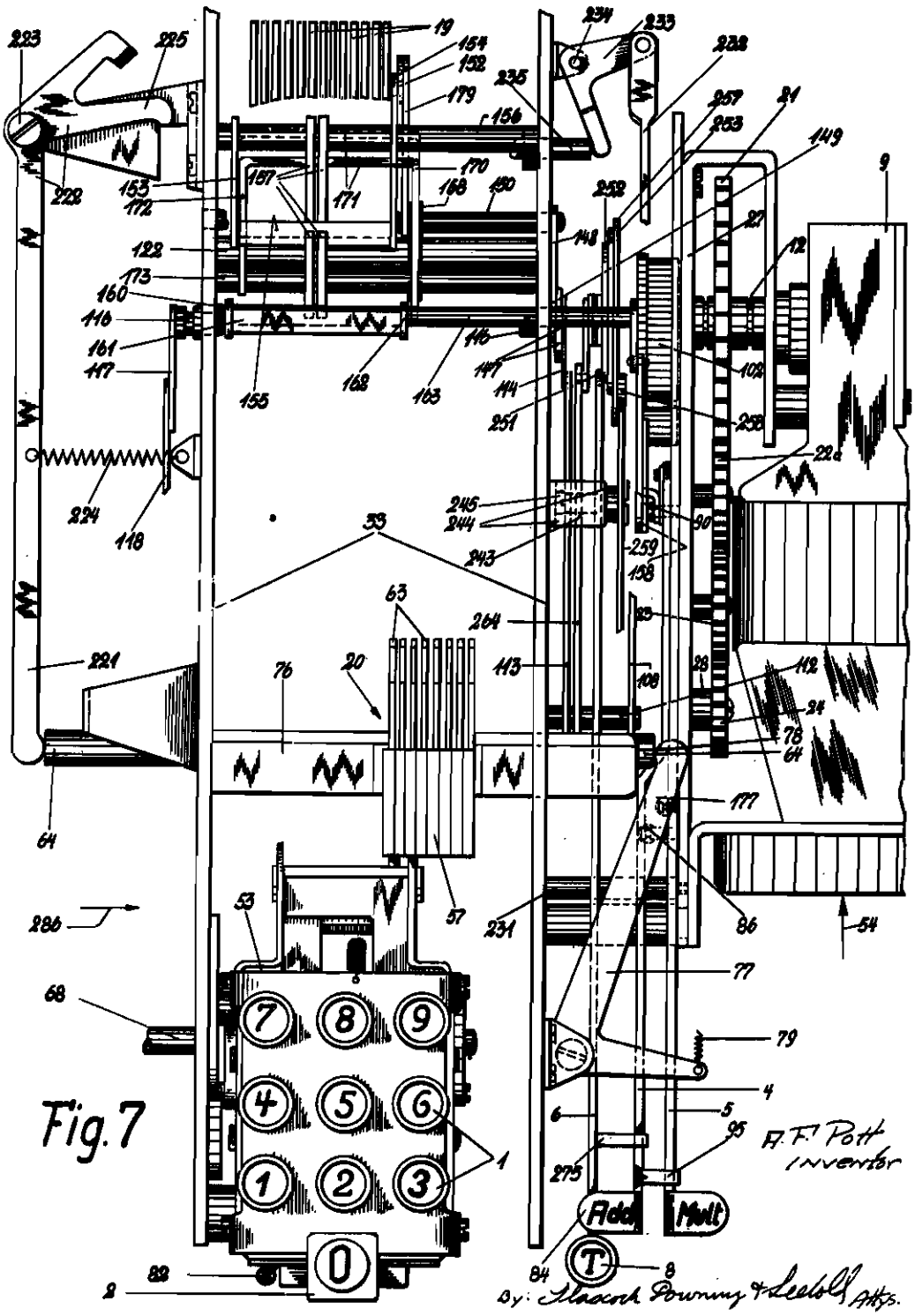

Fig. 7

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CALCULATING MACHINES, CASH REGISTERS OR THE LIKE

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Fig.8

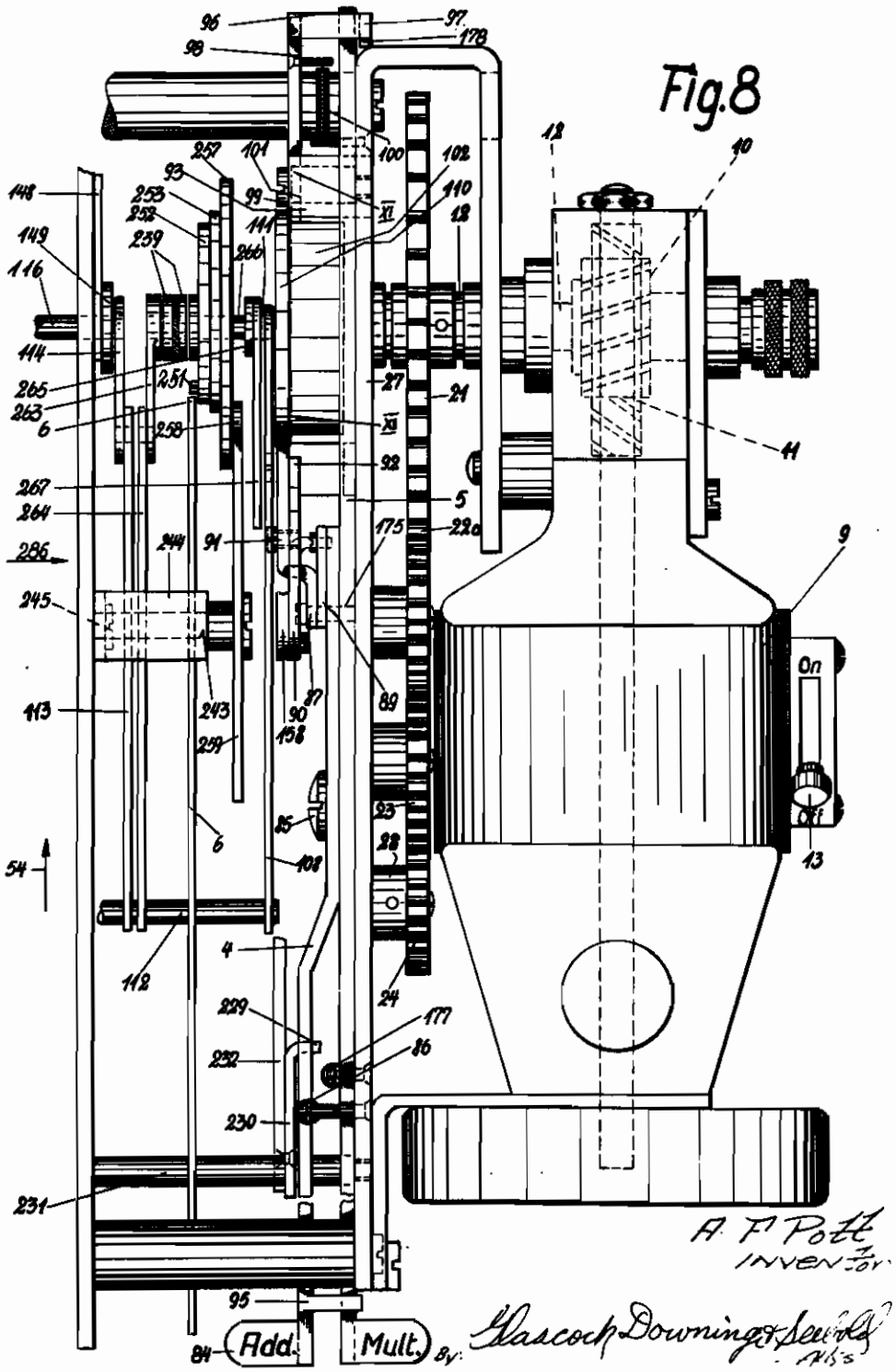

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Fig.9

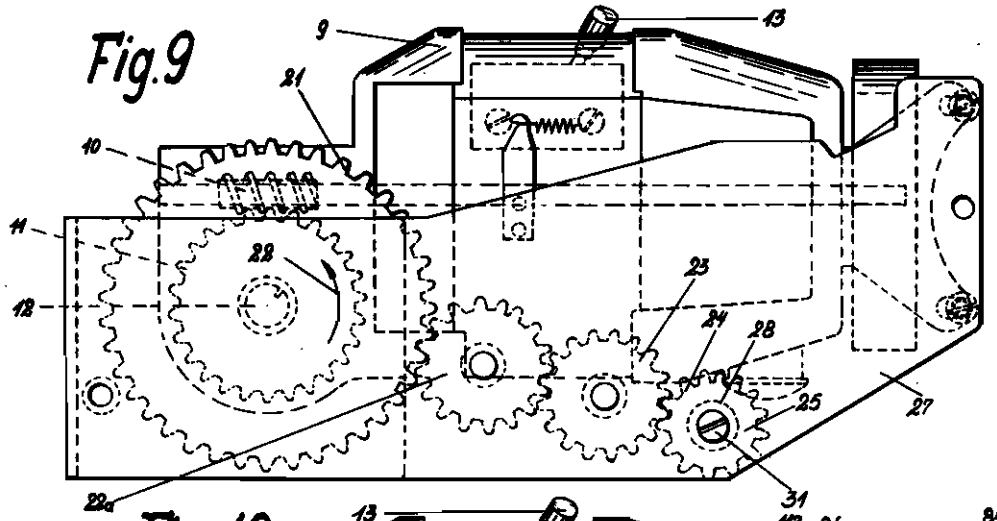
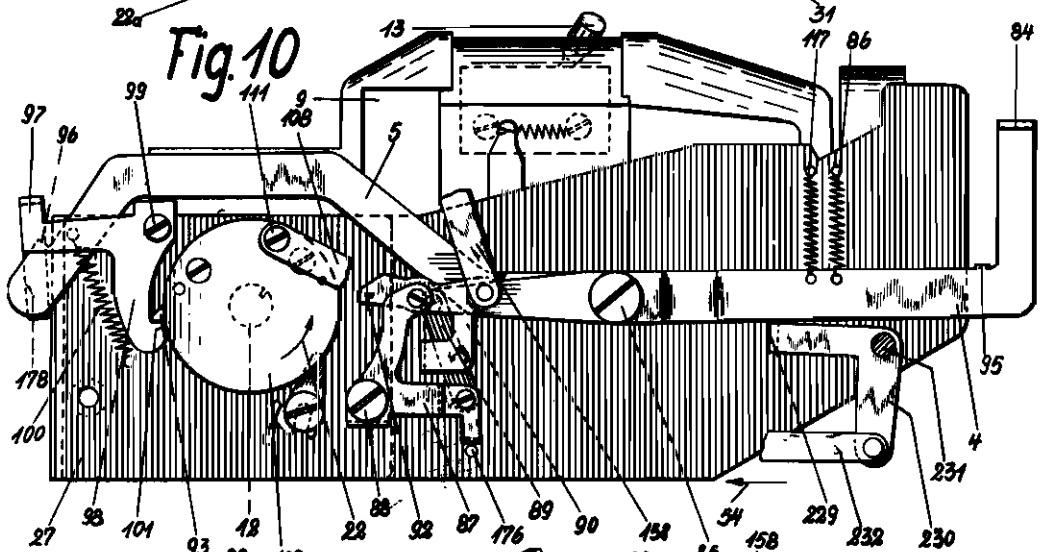


Fig.10



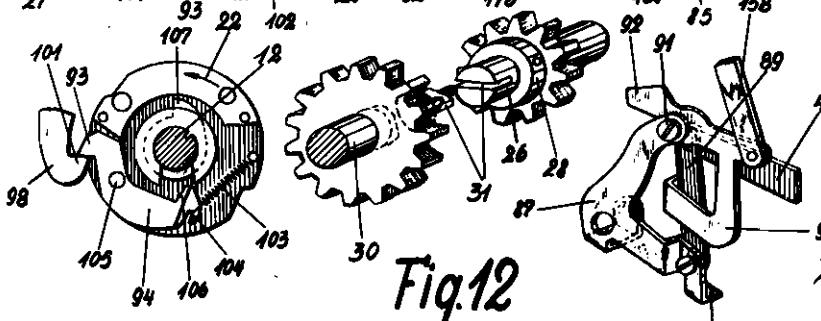


Fig.11

Fig.12

Fig.13

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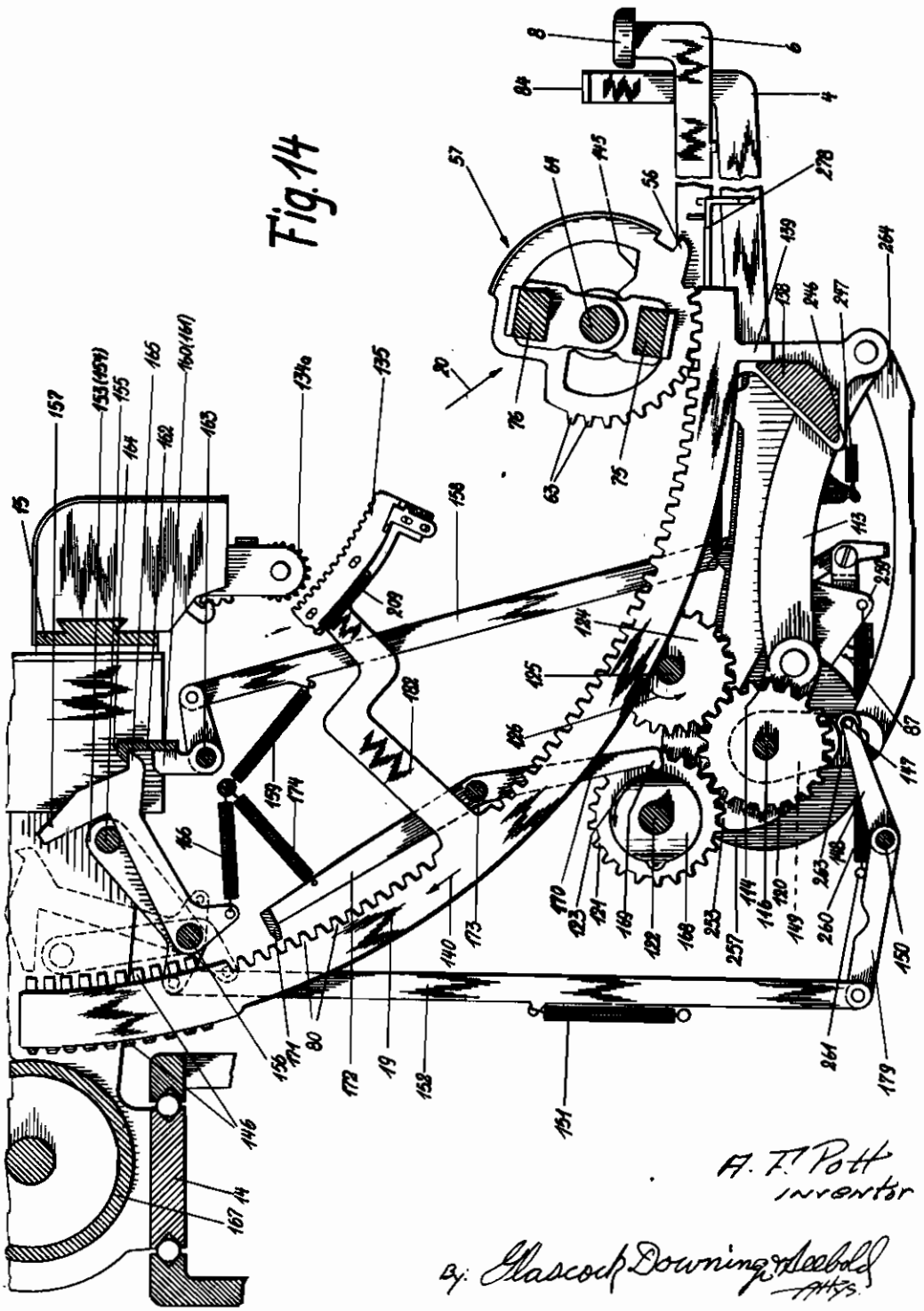
Fig. 14



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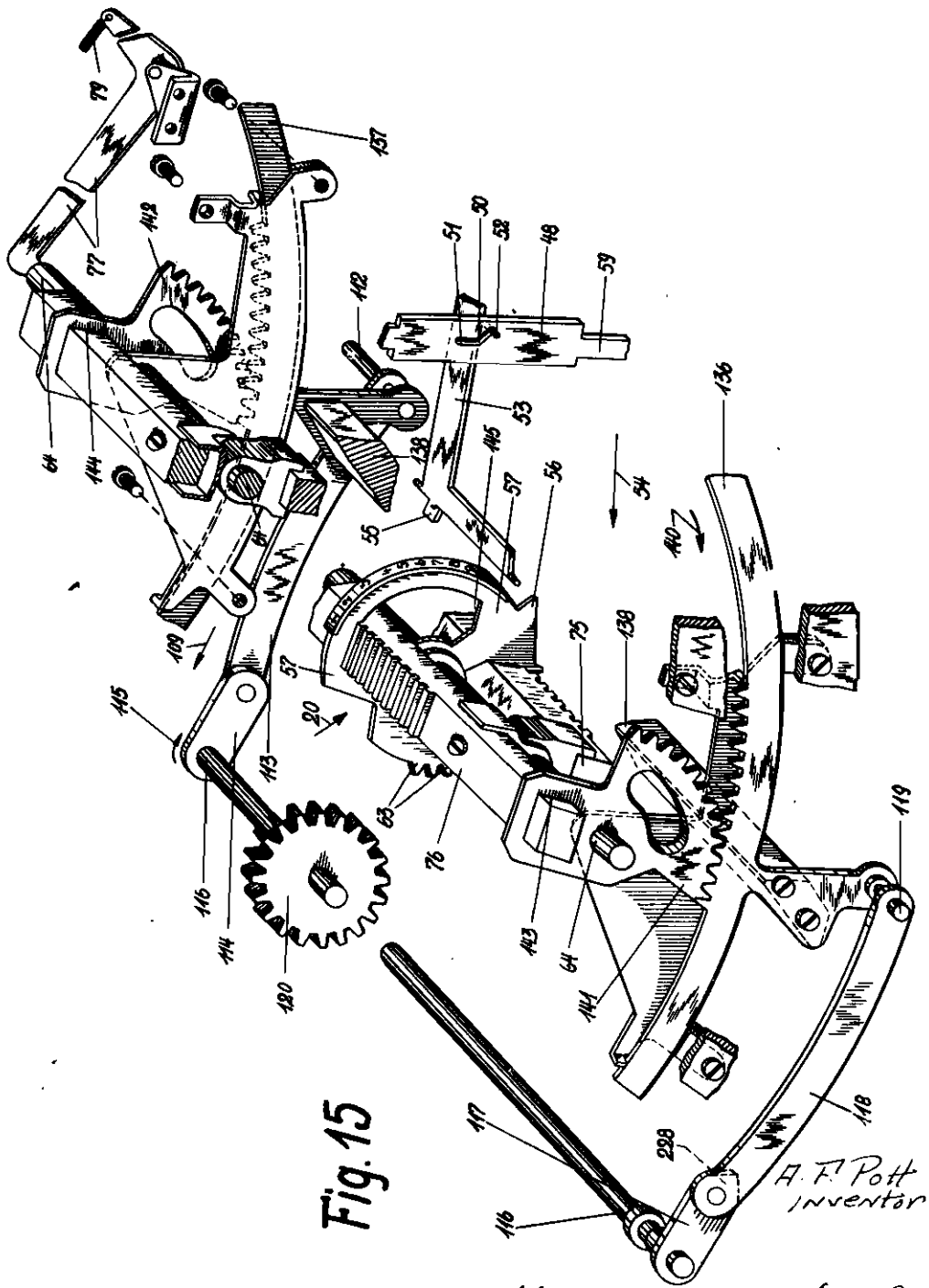

Fig. 15

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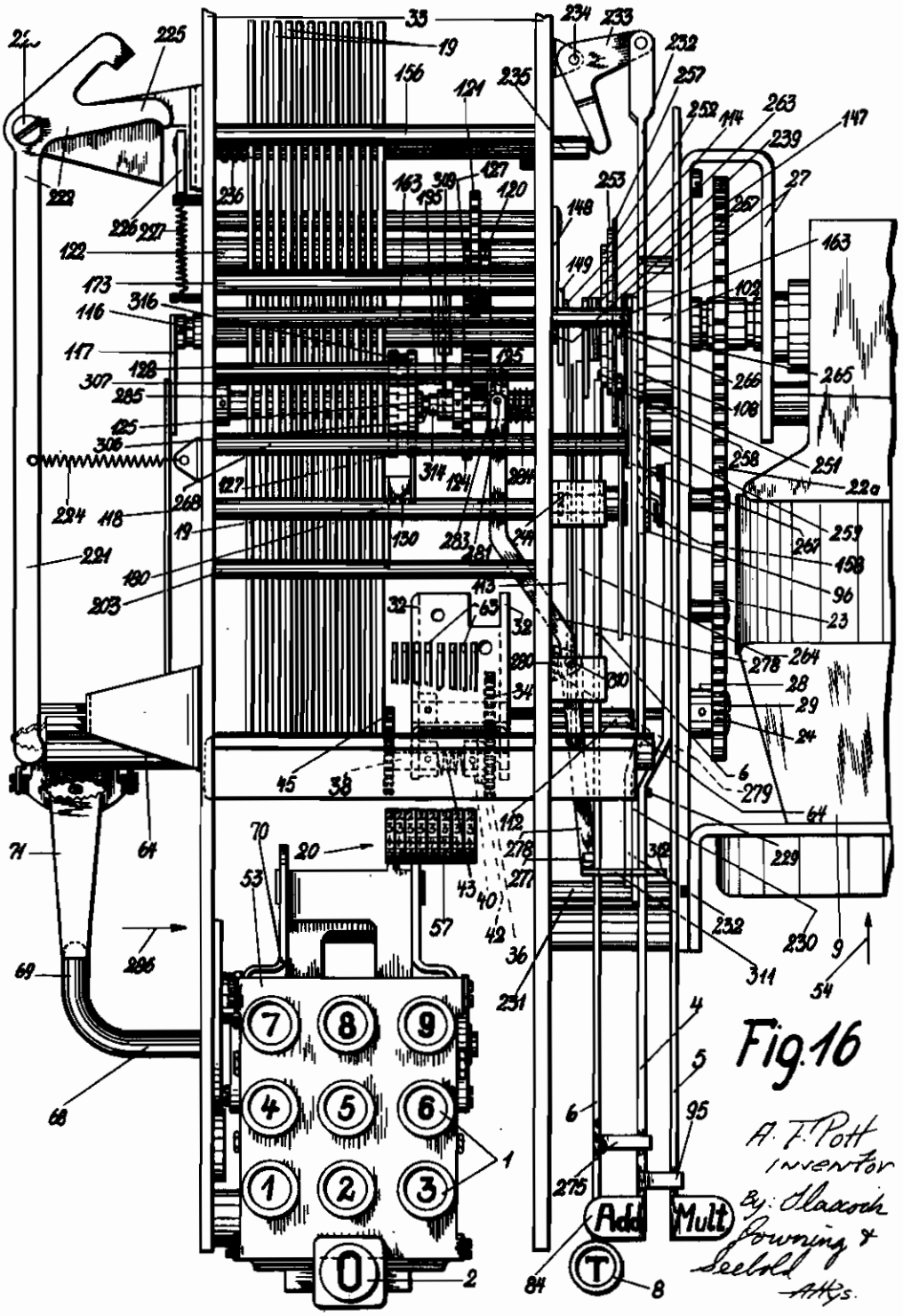

Fig. 16

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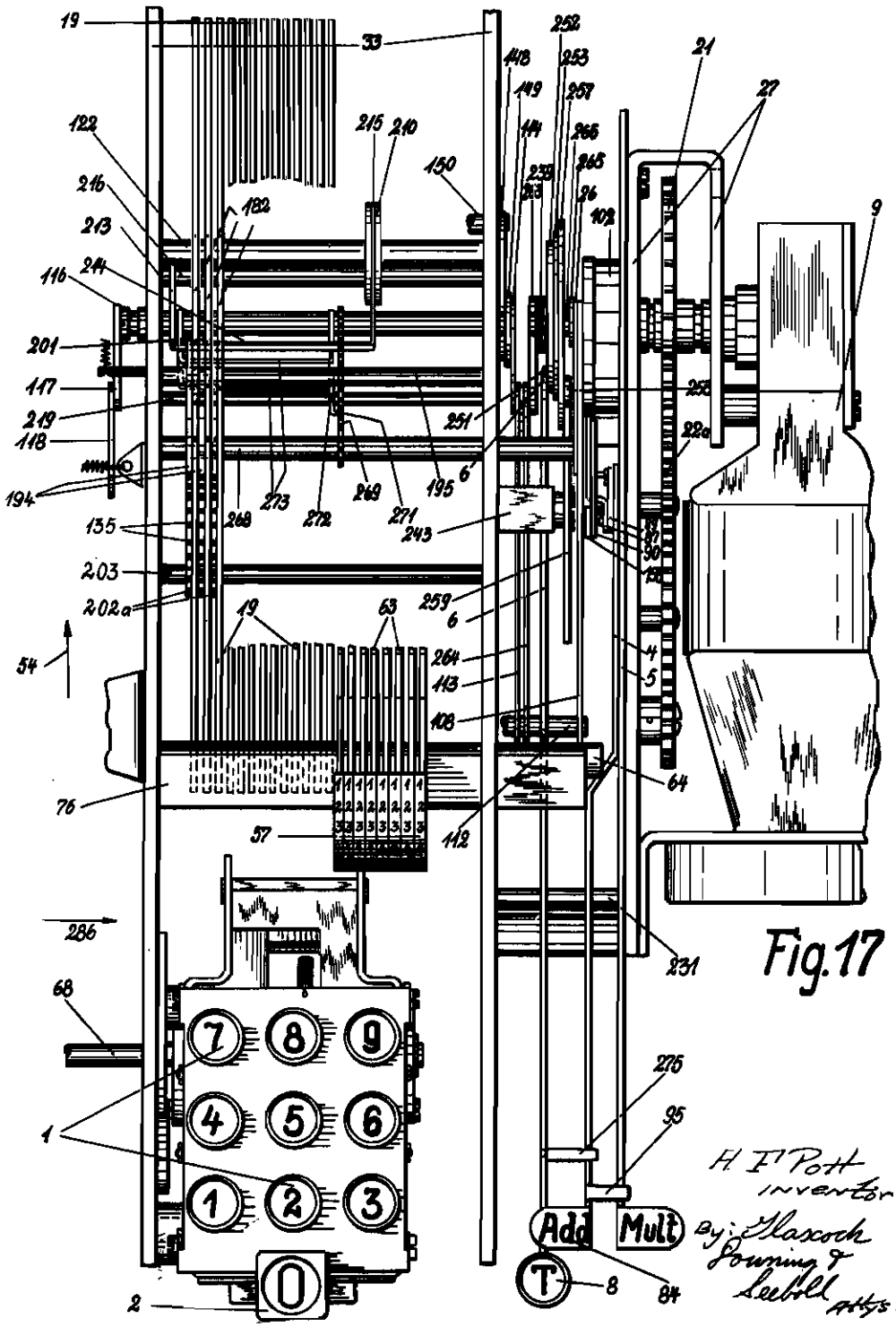

Fig. 17

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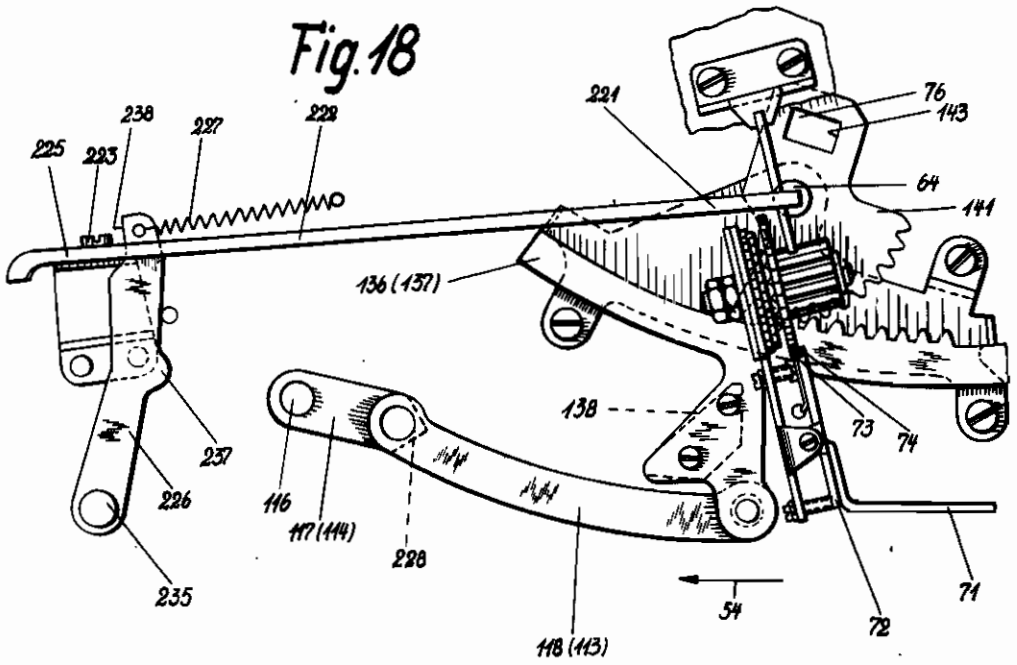
Fig. 18



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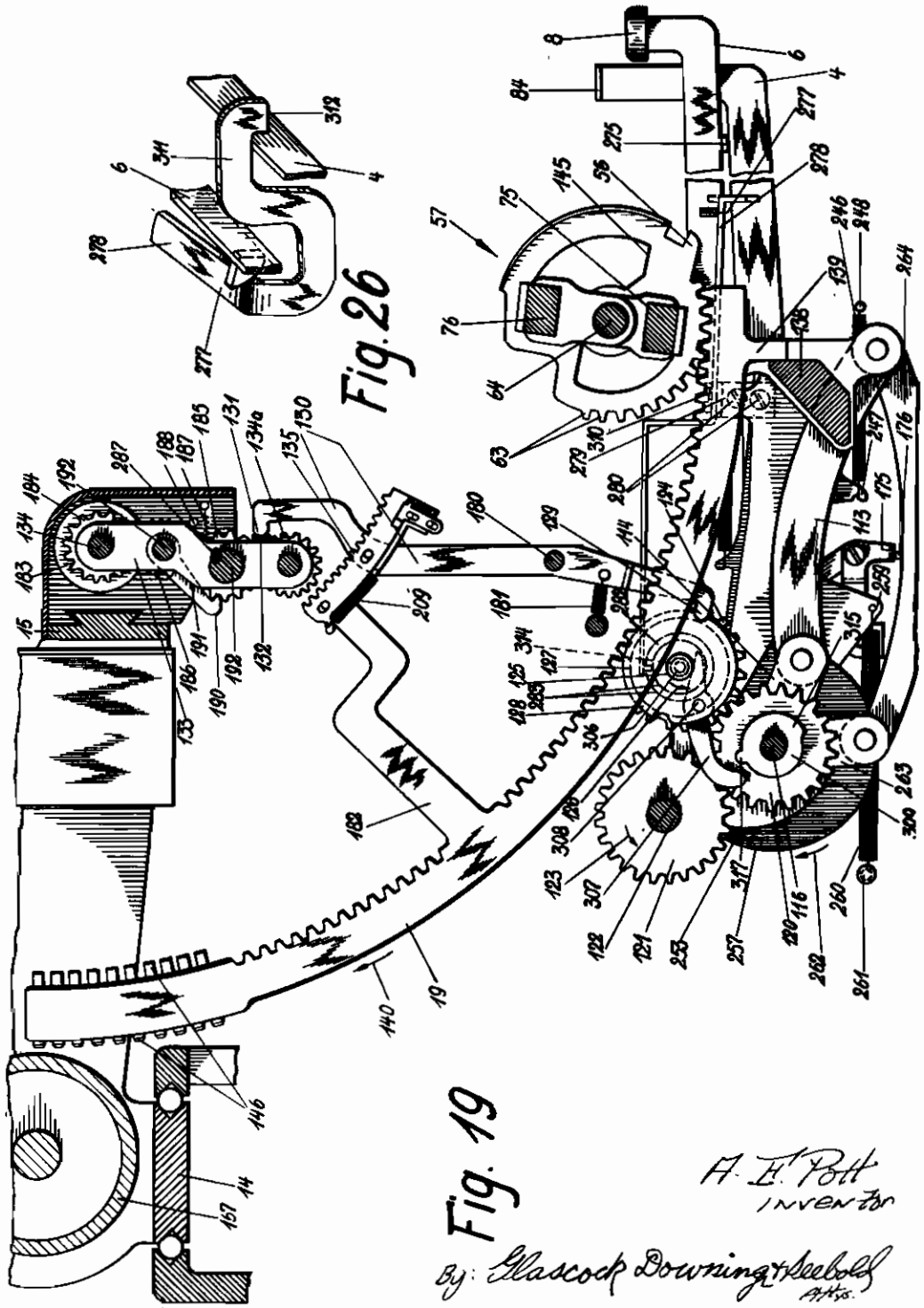

Fig. 26

Fig. 19

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Fig. 20

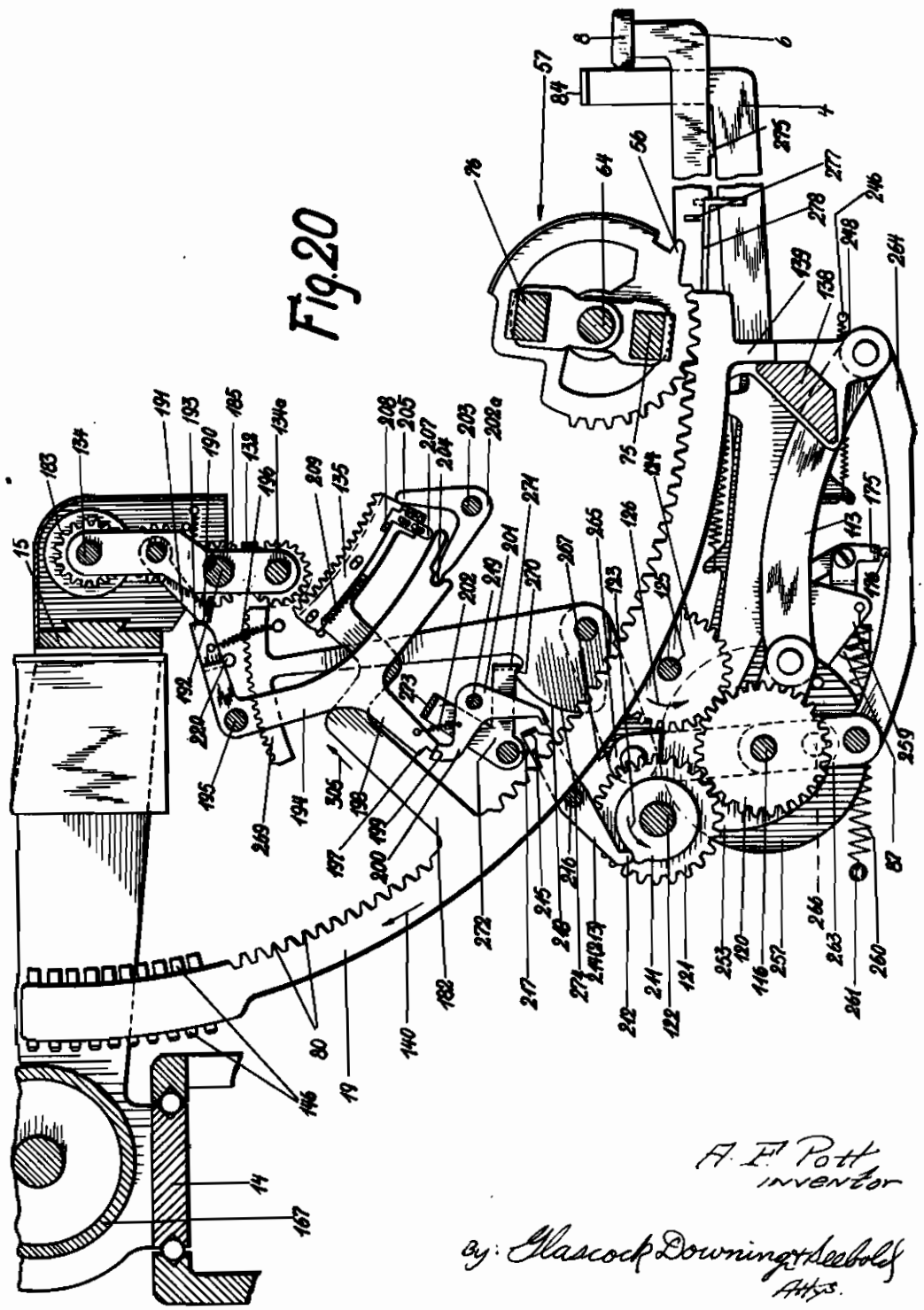

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Fig.21

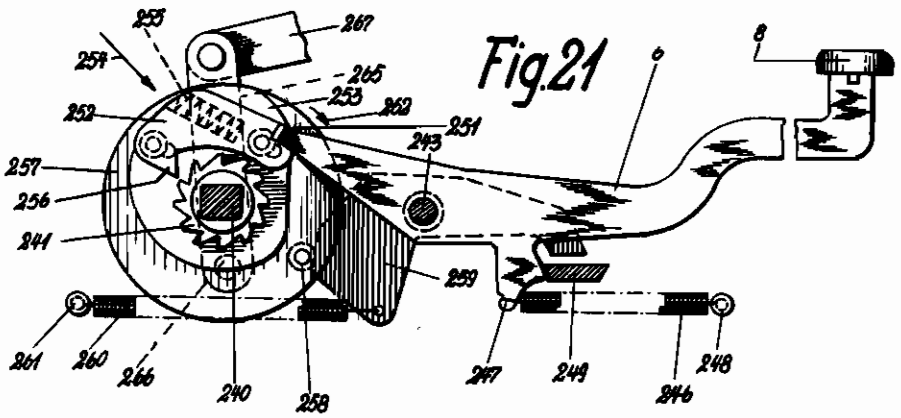
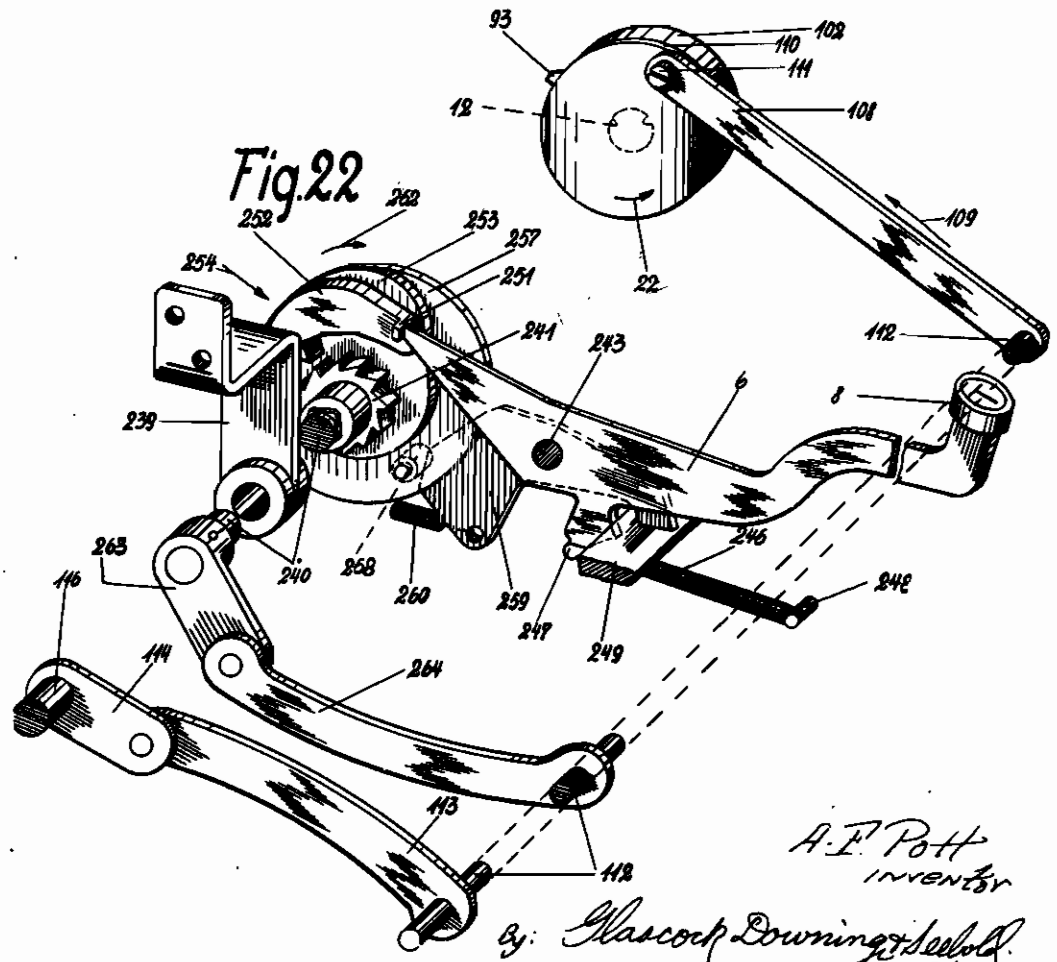


Fig.22



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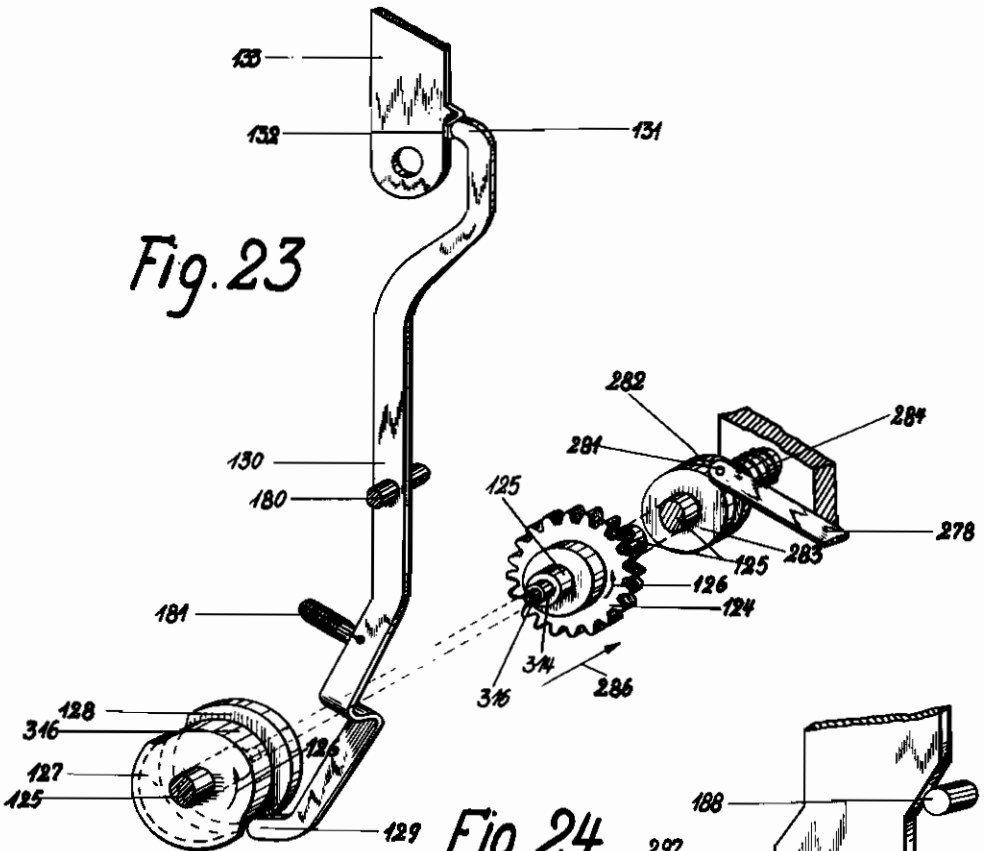

Fig. 23

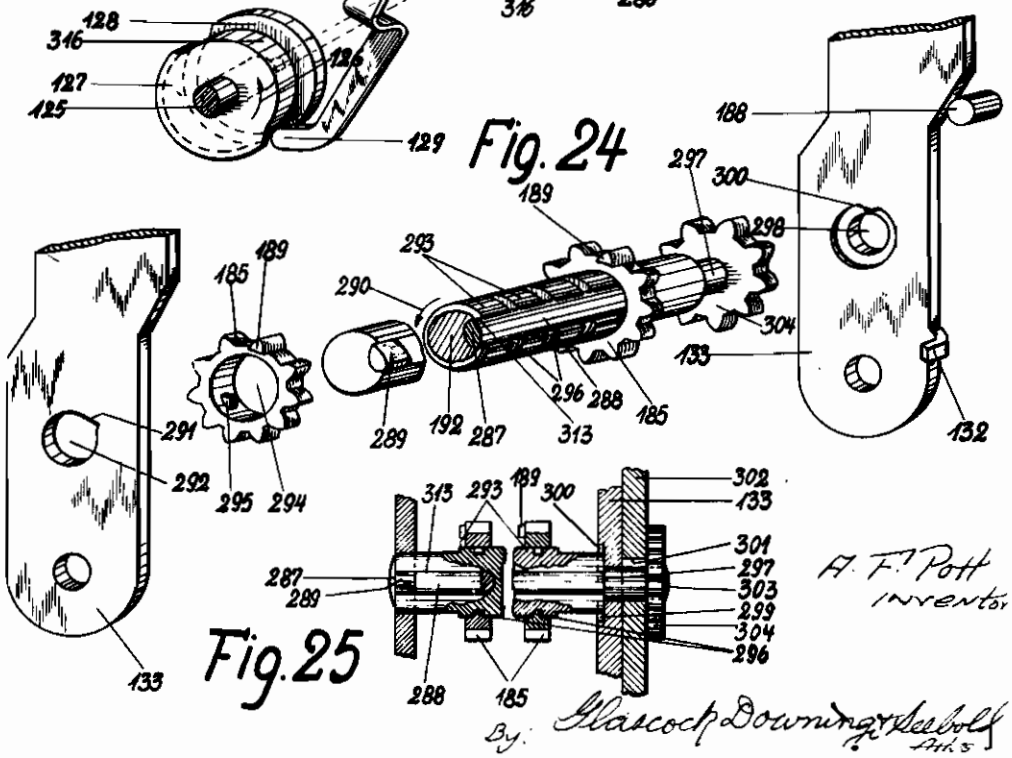

Fig. 24

Fig. 25

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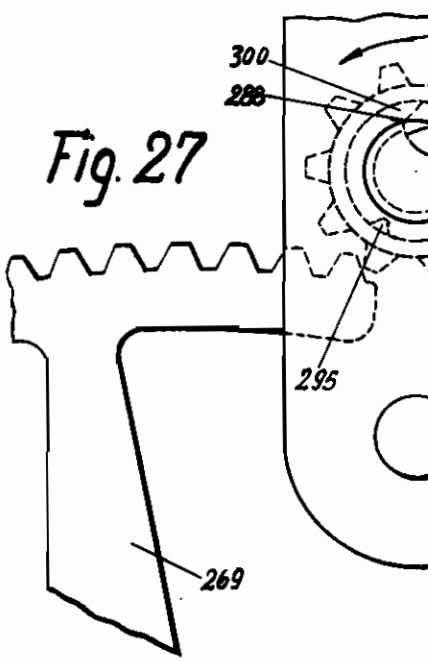
Fig. 27



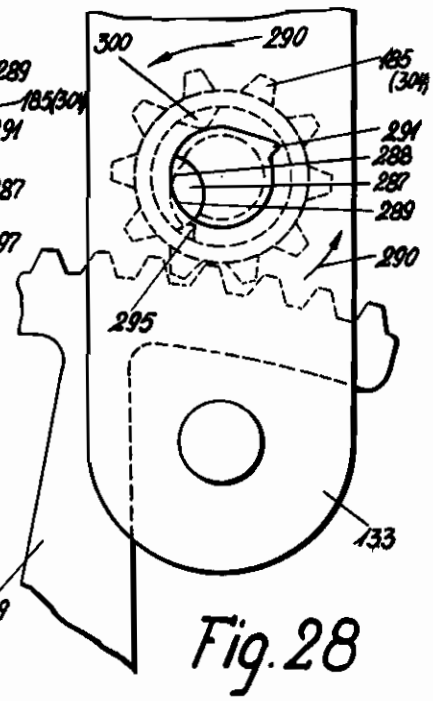


Fig. 28

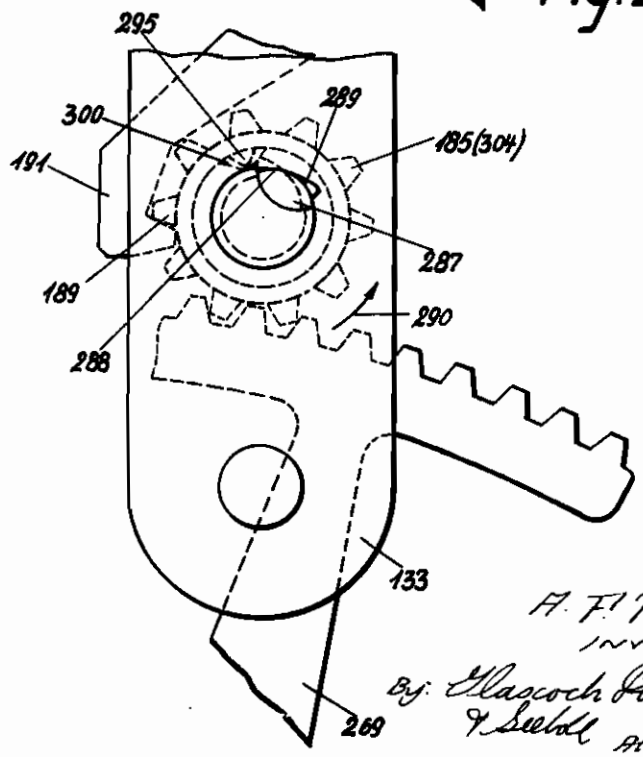


Fig. 29

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ALIEN PROPERTY CUSTODIAN

CALCULATING MACHINES, CASH REGISTERS OR THE LIKE

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Application filed December 29, 1937

This application is a continuation of my applications Ser. No. 35,546 and 83,751 and relates to calculating machines, cash registers or the like having totalizers moved by the paper carriage for the simultaneous calculation of all the denominations of a multi-denominational value.

In these machines, as is known, totalizers of different width are used and are disposed as required on the carriage. The actuating mechanism, therefore must have a number of actuator segments and type-printing rods corresponding to the widest totalizer.

When a narrow totalizer is located over the actuating mechanism, no difficulties are encountered in holding the actuator segments lying to the left adjacent the totalizer in their rest position since they were not set from the keyboard for any movement.

On the contrary difficulties are encountered in total-taking, since in this case only those actuators need be operated which stand opposite to the operative totalizer and within the width of this totalizer only those actuator segments which stand opposite to the denominations containing a value.

These difficulties were attempted to be overcome in calculating machines in which the drive of the type-printing members in the setting direction was effected by spring power, by incorporating in the machine a locking mechanism which was released in dependence upon the totalizer in the working position by a control member arranged on this totalizer so that only the denominations of the actuator mechanism were released which correspond to the number of the denominations of the totalizer in the working position. In these totalizers, however, no means were provided for automatically preventing errors in total-taking due to the totalizers being incorrectly set through inattention or mistake on the part of the operator. These devices, moreover, were unsuitable for overcoming the difficulties in machines in which both the forward and backward movements of the totalizer actuating members and of the type-printing rods were effected positively.

According to the invention these difficulties are overcome in this type of machine also, by providing for each totalizer a zeroizing device operated preferably by a power drive and by taking totals by this zeroizing device. By this construction the provision of a locking mechanism is dispensed with so that the building of the machine is simplified. Also, with this arrangement security is provided against incorrect settings.

In the drawings, one example of construction of the invention is represented.

Figure 1 shows a front elevation of the machine.

Figure 2 shows a side elevation of the arrangement of the adjusting and indicating wheels as well as of the keyboard, viewed in the arrow direction **286** of Fig. 1 according to the section line II—II.

Figure 3 shows an elevation in perspective of the friction clutch coupling taken from the left hand front of the machine.

Figure 4 shows a perspective elevation of the escapement taken from the left hand front of the machine.

Figure 5 shows a side elevation of the keyboard according to the section line V—V of Fig. 6 and viewed in the arrow direction **288** of Fig. 1 in which view the mechanisms are located in the rest position. The left hand side wall of the machine is removed for the sake of clearness.

Figure 6 shows a plan of the keyboard in which the cover plate and the base plate are removed for the sake of clearness.

Figure 7 shows a plan of the machine in which the printing mechanism, the adjusting and indicating wheels, the zeroizing mechanism for the adjusting and indicating wheels and different other parts are illustrated while the cover plates and the paper carriage are removed for the sake of clearness and in which different mechanisms are not illustrated in order to disclose others.

Figure 8 shows a plan of the coupling mechanism arranged on a plate fixed to the motor housing and located in the rest position according to Fig. 7 in an enlarged scale.

Figure 9 shows a side elevation of the coupling mechanism according to Fig. 8, whereby only the parts are illustrated, which are lying on the right hand side of the plate.

Figure 10 shows a side elevation of the coupling mechanism according to Fig. 8, whereby only the parts are illustrated, which are lying on the left hand side of the plate.

Figure 11 shows a section of the drive coupling viewed in the arrow direction **286** of Fig. 8 and along the section line XI—XI.

Fig. 12 shows in perspective a detail of Fig. 9.

Fig. 13 shows in perspective a detail of Fig. 10.

Fig. 14 shows a side elevation of a section according to the section line II—II of Fig. 1 and viewed in the arorw direction **286** in which view the printing mechanisms and the adjusting and

indicating wheels are located in the rest position. The right hand wall of the machine is removed for the sake of clearness.

Fig. 15 shows a perspective elevation, viewed from the left hand front of the machine, of the arrangement of the adjusting and indicating wheels as well as the mechanisms which return the adjusting and indicating wheels to their rest position, in which view different parts for the sake of clearness are represented drawn out from one another.

Figure 16 shows a plan of the machine in which is illustrated the invention and in which the cover plates and the paper carriage are removed for the sake of clearness. Different mechanisms are not illustrated in order to disclose others.

Figure 17 shows a plan of the coupling and driving mechanism in an enlarged scale.

Figure 18 shows a side elevation according to Fig. 7 with the cover plate removed, in which only the mechanisms are illustrated which are arranged in front of the left hand side wall of the machine, the view being taken in the arrow direction 288 of Fig. 1.

Figure 19 shows a side elevation of the coupling mechanism for the register of a section according to the section line II—II of Fig. 1 and viewed in the arrow direction 286 in which view the mechanisms are located in the rest position. The right hand side wall of the machine is removed for the sake of clearness.

Figure 20 shows a side elevation according to Fig. 19, in which view the arrangement of the resetting device is illustrated.

Figure 21 shows a side elevation of the coupling mechanism for the total taking mechanism the view being taken in the arrow direction 286 of Fig. 1.

Figure 22 shows a perspective elevation, viewed from the left hand front of the machine, of the arrangement of the couplings, in which view different parts for the sake of clearness are represented drawn out from one another.

Figure 23 shows in perspective a detail of Fig. 16.

Figure 24 shows a perspective elevation, viewed from the left hand front of the machine of the arrangement of the resetting device, in which view different parts for the sake of clearness are represented drawn out from one another.

Figure 25 shows a longitudinal section according to Fig. 24.

Fig. 26 shows a perspective detail of Fig. 19.

Figure 27 shows a side elevation of the resetting shaft is shown in its home position.

Fig. 28 shows likewise a side elevation of the resetting device according to Fig. 24 in which view the resetting shaft is shown in an intermediate working position.

Figure 29 shows a further side elevation of the resetting device according to Fig. 24 in which view the resetting shaft is shown in the working position, in which the resetting process is just brought to an end.

For the sake of a better understanding of the present invention it seems advisable to briefly set forth the operation of said machine as described in the copending application Nr. 14,898 under the headings "General description," "Setting up of a value into the adjusting and indicating wheels," "Operation of the drive for the adding and printing mechanism," "Operation of the printing mechanism," and "Retraction of the adjusting and indicating wheels to their right hand position."

General description

On the front of the machine the keys 1 which are marked from "1" to "9" (Fig. 7) and the key 2, which is indicated by "0" are arranged. Above the keys 1 and 2 the inspection aperture 3 (Fig. 1) for the indicating mechanism is disposed. On the right hand side of the machine the addition key lever 4, the multiplication key lever 5 and the total key lever 6 are arranged. The forwardly directed end of the addition key lever 4 is bent upwards (Fig. 10) and the free upwardly directed end again bent off at right angles to the left is provided with the marking "Add." The forwardly and upwardly directed free end of the key lever 5 is bent off at right angles to the right and provided with the marking "Mult." The free forwardly directed end of the key lever 6 is provided with a key 8, which is marked with "T" (Fig. 7). Further a motor 9 (Fig. 1) is removably attached on the right hand side of the machine. The rotations of the motor 8 are transferred through a worm 10 (Figures 8 and 9) and a worm wheel 11 to a driving shaft 12. The motor 9 is switched in by means of a handle 13, which is likewise arranged on the right hand side of the machine. On the rear side of the machine the paper carriage 14 (Fig. 1) is arranged. On the paper carriage 14 as many totalizers as desired of different widths are arranged on a totalizer attaching rail 15 (Fig. 14) in Fig. 1 only three totalizers 16, 17 and 18 are illustrated) and in the present case by way of example the totalizer 16 has ten denominations, the totalizer 17 six denominations and the totalizer 18 twelve denominations.

In Fig. 1 the six denominational totalizer 17, is, for example, in the working position in which the units denomination of the totalizer 17 is opposite to the actuator segment 19 (Fig. 14) lying farthest to the right.

Setting up of a value into the adjusting and indicating wheels

The value to be registered in one of the totalizers is first set in an adjusting wheel carriage 20 (Figs. 7, 14 and 15). This is performed by depression of the corresponding keys 1, whereby the following mechanisms are operated.

First, it is necessary to switch in the motor 9 by means of the handle 13, whereon the motor 9 commences to rotate. The main drive shaft 12 and the toothed wheel 21 mounted on the shaft are hereby rotated in the arrow direction 22 (Fig. 9) by way of the worm 10 and the worm wheel 11. The toothed wheel 21 engaging with the intermediary toothed wheel 22*a* which engages with the intermediary toothed wheel 23. The latter drives the toothed wheel 24 in the arrow direction 25. The wheel 24 is rigidly connected with a stub shaft 26 (Fig. 12) which is rotatably mounted in the plate 27. The stub shaft 26 is secured against axial displacement by means of a collar 28 (Figs. 9 and 12) and a screw 29 (Fig. 16). In order to transmit the driving movement to the stub shaft 30, a plug connection 31 (Fig. 12) is provided. The stub shaft 30 is rotatably mounted in a U-shaped part 32 (Figs. 3 and 2) which latter is fixed to the machine frame 33 in any suitable manner. On the stub shaft 30, a toothed wheel 34 is rigidly mounted which meshes with a toothed wheel 35. The latter is in engagement with the toothed wheel 36 which rotates in the arrow direction 37. The wheel 36 is rotatably mounted on a rotatably mounted shaft 38. A sleeve 39 is slidably but non-rotat-

ably arranged on the shaft 38 by means of a pin and slot connection 40, 41. Between the sleeve 39 and the wheel 36 a washer 42 of vulcanized fibre is arranged. The washer 42 constitutes a friction member which is pressed against the wheel 35 by means of a compression spring 43, arranged between the sleeve 39 and a collar 44 fixed on the shaft 38. On the shaft 35, a master wheel 45 is rigidly mounted. With the wheel 45 (Fig. 2), two teeth 46 of a lever 47 are engaged holding thereby the parts 45, 38, 44, 39 against rotation, whereas the wheel 36 rotates as long as the switching in lever 13 is set to "On" (Fig. 8).

On the depression of one of the keys 1 (Fig. 5) the corresponding key stem 48 is moved downwards against the action of its spring 49. Hereby the upper edge 50 of the slot 51 located in the key stem 48 acts on the pin 52 of the corresponding slide 53, whereby the latter is moved rearwards in the arrow direction 54 so that the nose 55 (Figs. 5 and 6) arranged on the slide 53 moves into the path of movement of the tooth 56 (Fig. 2) of the adjusting and indicating wheel 57 standing in the working position.

Simultaneously with the depression of one of the keys 1 (Figs. 5 and 6), the associated key stem 48 acts with its lower edge 58 of the reduced part 59 on the part 60 or 61 (Fig. 6) of the lever 47 (Figs. 2 and 5) whereby the lever 47 is swung in the clockwise direction round the screw 62 (Fig. 2). Hereby, the teeth 46 of the lever 47 move out of engagement with the teeth of the toothed wheel 45 so that the latter in consequence of the frictional force exerted by the spring 43 (Fig. 3) can participate in the rotation of the toothed wheel 36 in the arrow direction 37, indicated in Fig. 2 owing to the action of the parts 42, 39, 40, 41 and 43. Since the extreme left hand adjusting and indicating wheel 57 of the adjusting wheel carriage 20 (Fig. 16) in the extreme right hand position of the same is located with its teeth 63 in engagement with the teeth of the toothed wheel 45 (Fig. 3) the adjusting and indicating wheel 57 is swung round the shaft 64 in the anti-clockwise direction until its tooth 56 strikes the nose 55 of the slide 53 corresponding to the depressed key 1, whereby the adjusting and indicating wheel 57 as well as the toothed wheel 45 in engagement with the same are prevented from further rotation in consequence of the friction drive 42, 39 while the toothed wheel 39 can still be rotated continually.

As soon as the adjusting and indicating wheel 57 has come to a standstill, the value corresponding to the depressed key 1 is visible in the inspection aperture 3 (Fig. 1) of the indicating mechanism.

In the depression of one of the keys 1, the corresponding key stem 46, as already described, acts on the lever 47 (Figs. 2 and 5) and the part 65 of the part 60 rivetted to the lever 47 acts on the edge 66 of the lever 67 (Fig. 2) rigidly mounted on the shaft 68, and swings the same in the clockwise direction. Hereby, the right- angled bent-off end 69 (Fig. 4) projecting from the left hand side wall 70 (Fig. 16) of the shaft 68 acts upwards on the part 71 mounted on the escapement rocker 72 (Fig. 4), whereby the escapement 73, 74 (Figs. 4 and 18) is actuated so that on the release of the key 1 concerned, the parts 64, 57, 75 and 76 (Fig. 19) which represent the adjusting wheel carriage are moved one step to the left, since the lever 77 (Fig. 7) with its part 78 acts under the pull of the spring 79 on the shaft 64. Hereby, the extreme left-hand adjusting and indicating wheel 57 moves out of engagement with the wheel 45 and into engagement with the teeth 80 of the right-hand actuator sector 16, whilst the second adjusting and indicating wheel 57 moves into engagement with the driving wheel 45.

Now the next key 1 can be depressed or the next number brought into the succeeding adjusting and indicating wheel 57, whereby the above described operations again take place for which reason they will not be further described.

Now, if in the adjustment of a numerical value a zero in the numerical value is to be set, it is only necessary to depress the zero key 2, whereby the following mechanisms are actuated.

On depression of the key 2, the key slide 81 is moved downwards against the action of the spring 82, whereby the same acts with its lower edge on the edge 93 (Fig. 2) of the lever 67 and rocks the latter as well as the shaft 68 in the clockwise direction, whereby the escapement on release of the key 2 is operated by way of the parts 69, 71. In consequence of this, a movement of the adjusting and indicating wheels 57 to the left takes place through one step. Since in the depression of the zero key 2 the lever 47 is not operated, the teeth 46 of the same do not release the toothed wheel 45 and obviously the corresponding adjusting and indicating wheel 57 cannot be rotated by way of the same. In the inspection aperture 3 of the indicating mechanism, there is thus a zero visible in this denomination.

Operation of the drive for the adding and printing mechanism

If it is desired to add and print the set up value the key 84 (Figs. 7 and 10) is depressed, whereby the key lever 4 is rocked round the screw 85 in the clockwise direction against the action of the spring 86 which engages with it. Hereby, the angle-lever 87 (Figs. 10 and 13) is rocked in the anti-clockwise direction round the screw 88 through the intermediary of the connecting rod 89. Consequently the pawl 90, which is pivotally arranged on the coupling lever 87 by means of a screw 91, comes with its nose 92 into the path of movement of the nose 93 of the coupling pawl 94 (Figs. 10, 11, 12 and 22). Furthermore, on depression of the key 84 the lug 95 (Figs. 7 and 10) bent off from the key lever 4 acts on the key lever 5 and rocks the same likewise in the clockwise direction round the screw 85. In this movement the projection 96 of the rearwardly directed part of the key lever 5 acts upwards against the bridge 97 (Fig. 8) of the U-shaped part of the coupling lever 98, whereby the latter is rocked round the screw 99 in the clockwise direction against the action of the spring 100. Hereby the nose 101 of the coupling lever 98 releases the nose 93 (Figs. 10 and 11) of the coupling pawl 94 located in the coupling casing 102. The coupling pawl 94 under the action of the spring 103 engaging with its nose 104 (Fig. 11) can now swing round the pin 105 in the anti-clockwise direction, whereby the nose 106 of the coupling pawl 94 comes into the path of movement of the cam 107 rigidly mounted on the main drive shaft 12. Since, as already described, the shaft 12 and the cam 107 are already in rotation, owing to the switching in of the motor 9, the nose of the cam 107 acts on the nose 108 of the coupling pawl 94 which has been brought into engagement with it. Since this pawl, in consequence of the action of the spring 103 is held in engagement with the

cam 107, the latter takes along with it the pawl 94 and consequently also the coupling casing 102 in the arrow direction 22.

In the rotation of the coupling 102 in the arrow direction 22 the rod 108 (Fig. 22) is moved in the arrow direction 109, owing to its connection to the cover 110 of the coupling housing 102 by means of the headed screw 111. By the movement of the rod 108 in the arrow direction 109 the stub shaft 112, fixed to the rod 108 is equally moved in the direction of the arrow 109. As a result, the lever 113 (Figs. 22 and 15) is moved in the arrow direction 109, rotating thereby the arm 114 in the direction of the arrow 115. The arm 114 is rigidly mounted on a shaft 116, rotatably mounted in the machine frame 33. On the other end of the shaft 116, a second two-armed arm 117 is rigidly mounted to which a lever 110 is pivoted which latter carries a stub shaft 119 axially arranged to the stub shaft 112. In the rotation of the shaft 116 participates also the toothed wheel 120 (Figs. 15, 16 and 14).

Simultaneously with said movement of the parts 102, 108, 112, the parts 264, 263 are moved in the same sense, whereby the shaft 240 (Fig. 22) is rotated likewise in the arrow direction 115. However no further mechanisms are operated thereby.

Since the toothed wheel 120 is in engagement with the toothed wheel 121 mounted on the shaft 122, the toothed wheel 121 is rotated in the arrow direction 123. The toothed wheel 124 mounted on the shaft 125 and standing in engagement with the toothed wheel 120 is hereby rotated in the arrow direction 126.

The cams 127 and 128 (Figs. 16, 19 and 23) rigidly mounted on the shaft 125 also participate in the rotation of the shaft 125 in the arrow direction 126. The cam 127 may be called the total cam because it controls the totalizer in total taking, whereas the cam 128 may be called the adding cam because it controls the totalizer in addition. Normally the cam 128 is in contact with the nose 129 of the lever 130 and as the nose 129 of the lever 130 in the rotation of the cam 128 in the arrow direction 126 slides on the lower part of the cam 128 (Fig. 19) the latter has no action during the first half of its revolution on the lever 130.

Consequently, the nose 131 may not act on the lug 132 of the totalizer frame 133, swingable round the shaft 134 (Fig. 19).

Referring now again to the stub shafts 119 and 112 in Fig. 15, it may be noted that each of them is pivotally connected to toothed sectors 136 and 137. The stub shafts 119 and 112 are guided in slots (not shown) in the side walls of the machine frame, which slots are concentrically arranged with the toothed sectors 136 and 137. The toothed sectors 138 and 137 are connected by a bar 138, cooperating with noses 139 (Fig. 14) on the actuators 19.

When the toothed sectors 136 (Fig. 15) and 137 are acted upon in the arrow direction 140 by way of the levers 113 and 118 in the above mentioned rotation of the lever 114 and 117 in the arrow direction 115, the bar 138 also travels in the arrow direction 54, whereby the noses 139 (Figs. 14 and 19) of the actuators 18 are released for movement. In this operation the toothed segments 141 and 142 (Fig. 15) which are in engagement with the toothed sectors 136 and 137 are swung round the shaft 64 in the clockwise direction in which swinging movement the beam 76 projecting into the recesses 143 and 144 of the toothed segments 141 and 142 also participates. In the swinging movement of the beam 76 in the clockwise direction round the shaft 64, this beam 76 acts successively on the edges 145 of the adjusting and indicating wheels 57 and swings the same in succession according as the adjusting and indicating wheels 57 were swung more or less in the anti-clockwise direction round the shaft 64 in the setting operation correspondingly to the set value.

As soon as the adjusting and indicating wheels 57 have swung in the clockwise direction in consequence of the action of the beam 76, the actuator segments 19 standing in engagement with the adjusting and indicating wheels 57, so far as in the denomination concerned a value was set, are also acted upon in the arrow direction 140 (Figs. 14, 19 and 20).

Operation of the printing mechanism

As soon as the beam 76 (Fig. 15) has returned the setting and indicating wheels 57 to their zero position, the actuator sectors 19 have been moved so far in the arrow direction 140 that the type members 146 mounted on the actuator sectors 19, corresponding to the value brought into the setting and indicating wheels 57 have moved into the printing position.

During the first half revolution of the shaft 116, the roller 147 (Fig. 14) of the lever 148 slides from the elevated part of the cam 149 on to the lower part of the cam 149, whereby the lever 148 and the shaft 150 are rocked in the anti-clockwise direction. Hereby the lever 148 is likewise rocked in the anti-clockwise direction under the action of the spring 151, whereby the connecting rod 152 is moved downwards. Consequently the bail 153, 154, 155 is rocked round the shaft 158 in the anti-clockwise direction into the position shown in Fig. 14 in dotted lines, so that the type hammers 157 are released.

After one-half of a revolution of the main drive shaft 12 (Figs. 9, 10) in which revolution the coupling casing 102 also participates, the nose 82 of the pawl 90, which on the depression of the key 84 moved into the path of movement of the nose 83 of the coupling pawl 94 in consequence of the further holding of the key 84 depressed, cooperates with the nose 83 of the coupling pawl 94, whereby the latter is swung round the pin 105 in the clockwise direction against the action of the spring 103, whereby the nose 108 of the coupling pawl 94 moves out of engagement with the cam 107. While the main drive shaft 12 still rotates the coupling casing 182 and the mechanisms in connection with it have come to rest.

As soon as the nose 93 of the coupling pawl 94 acts upon the nose 92 of the pawl 90, the latter is rocked in the clockwise direction round the screw 91, whereby the connecting rod 150 (Figs. 10 and 14) is moved downwards against the action of the spring 159. Hereby the bail 160, 161, 162 is rocked in the clockwise direction round the shaft 183, whereby the projection 164 of the bridge 162 of the locking bail 160, 161, 162, releases the projections 165 of the hammers 157, so that the same are swung in the anti-clockwise direction round the shaft 156 under the action of the springs 166. Consequently the hammers 157 strike against the printing types 146, whereby the value, which has been set, is typed upon the platen 167. After the printing has been effected, the hammers 157 fall back

into the position shown in Fig. 14 in dotted lines, in which position the hammers 157 are held by the springs 166.

During the printing of the value upon the platen 197 (Fig. 14) the cam 166 which is arranged on the shaft 122 acts with its elevated part upon the nose 169 of the lever 170, whereby the bail 170, 171, 172 is rocked in the anti-clockwise direction round the shaft 173 against the action of the spring 174, so that the part 171 of the bail 170, 171, 172 comes into engagement with the teeth 60 of the actuator sectors 19.

Consequently the actuator sectors 19 are locked in their printing position. After the printing is effected the nose 199 of the lever 170 of the bail 170, 171, 172 slides from the elevated part of the cam 168 on the lower part of the cam 198, whereby the bail 170, 171, 172 is rocked round the shaft 173 under the action of the spring 174 in the clockwise direction, so that the part 171 of the bail 170, 171, 172 comes out of engagement with the teeth 60 of the actuator sectors 19, whereby the same are unlocked.

After the printing is effected, the key 84 (Fig. 10) is released, whereby the key lever 4 under the action of the spring 86 rocks round the arrow 85 in the anti-clockwise direction and is brought back into its position illustrated in Fig. 10. The angle lever 87 is hereby swung in the clockwise direction round the screw 98 by way of the connecting rod 89 until the part 175 (Fig. 13) of the pawl 87 strikes the pin 178, whereby the rest position of the parts 87, 80, 4 is determined.

In this operation, the nose 92 (Fig. 10) of the pawl 90 has released the nose 93 of the coupling pawl 94 (Fig. 11) so that the same can swing round the pin 105 under the action of its spring 103, whereby the nose 106 of the coupling pawl 94 comes again into the path of movement of the cam 107, so that the coupling casing 102 again participates in the further rotation of the cam 107. In the swinging of the lever 4 in the anti-clockwise direction (Fig. 10), the lever 5 under the action of the spring 177 can likewise swing round the screw 85 in the anti-clockwise direction and return into its rest position illustrated in Fig. 10, since the lug 95 arranged on the lever 4 releases the lever 5. The projection 98 of the rearwardly directed part of the lever 5 hereby releases the bridge 97 of the pawl 88 so that the latter under the action of its spring 100 can swing back into its rest position, illustrated in Fig. 10, which is determined by the striking of the downwardly directed limb of the U-shaped part 179 of the pawl 98 against the plate 27. In the swinging of the pawl 98 in the anti-clockwise direction the nose 101 of the same has been moved into the path of movement of the nose 93 of the coupling pawl 94.

As soon as the projection 92 of the pawl 69 releases the projection 93 of the pawl 94 of the coupling housing 182, the pawl 90 is rocked in the anti-clockwise direction round the screw 91 under the action of the spring 159 (Fig. 14), which is arranged on the connecting bar 159 so that the bail 160, 161, 162 is rocked in the anti-clockwise direction round the shaft 163 in the position, shown in Fig. 14. In this position the projection 164 of the bridge 162 of the bail 160, 161, 162, comes in the moving path of the projection 165 of the hammers 157.

After a half revolution of the shaft 116, the roller 147 (Fig. 14) of the lever 149 slides from the lower part of the cam 149 on the elevated part of the cam 149, whereby the lever 148, the shaft 150 and the lever 179 are rocked in the clockwise direction against the action of the spring 151. Hereby the connecting rod 152 is moved upwards, whereby the bail 153, 154, 155 is rocked in the clockwise direction round the shaft 156. Consequently the bar 155 of the bail 153, 154, 155 acts upon the hammers 157, so that the hammers 157 are rocked in the clockwise direction round the shaft 156 against the action of the springs 166. Hereby the projection 165 of the hammers 157 acts upon the projection 164 of the bridge 162 of the bail 160, 161, 162 and rocks the same in the clockwise direction round the shaft 163 against the action of the spring 159, which is connected with the connecting rod 150. The rocking movement of the pawl 90 remains hereby without influence on the parts. As soon as the projection 185 of the hammers 157 comes to lie underneath the projection 164 of the bridge 162 of the bail 160, 161, 162, the projection 164 of the bridge 162 of the bail 190, 101, 162 snaps under the action of the spring 159 over the projections 165 of the hammers 157 so that the same are locked in their rest positions.

Operation of the adding mechanism

During the second half of the revolution of the coupling casing 102 in the arrow direction 22 (Fig. 10) the toothed sectors 136 and 137 (Fig. 15) are moved by way of the levers 118 and 113 in the opposite direction of the arrow direction 140 whereby the toothed segments 141 and 142 standing in engagement with them are acted upon round the shaft 64 in the anti-clockwise direction, whereby the beam 78 is likewise swung in the anti-clockwise direction into the normal position represented in Fig. 15.

Besides the actuator sectors 19 are naturally also brought back into the rest position by the beam 138 fixed to the toothed sectors 136 and 137 in consequence of its action on the noses 138 (Fig. 14) of the actuator sectors 18.

Directly at the beginning of the second half-revolution of the main drive shaft 12 the cam 128 (Figs. 19 and 23) acts with its raised part on the nose 129 of the two-armed lever 138, whereby the latter is swung round the shaft 180 in the anti-clockwise direction against the action of the spring 161. In the swinging movement of the lever 130 in the anti-clockwise direction the nose 191 of the lever 130 acts on the lug 132 of the totalizer frame 133 whereby the same is swung in the clockwise direction round the shaft 134 (Fig. 19) mounted in the two side walls of the totalizer with the result that the toothed wheels 134a of the totalizer located in the working position move into engagement with the teeth of the racks 135 of the arms 192 of the toothed sectors 18. Now, as soon as the toothed sectors 19 are moved in the opposite direction to the arrow 140, the toothed wheels 134a of the totalizer located in the working position are rotated in the arrow direction indicated in Fig. 19, since, as hereinbefore described, the toothed wheel set 134a has been brought into engagement with the racks 135. Consequently, the numeral wheels 183, which are in fixed connection with the toothed wheels 184 are rotated by way of the toothed wheels 195, 109 in the clockwise direction corresponding to the value brought into the setting and indicating wheels 57. The value registered on the numeral wheels 183 is visible in the inspection aperture of the totalizer.

Shortly before the completion of a full revolu-

tion of the coupling casing 102 the nose 129 (Fig. 23) of the two-armed lever 130 slides off from the raised part of the cam 128, whereby the lever 130 is swung round the shaft 180 in the clockwise direction under the action of the spring 181. With this, the nose 131 of the lever 130 releases the lug 132 of the frame 133 of the totalizer, located in the working position, whereby the same is swung round the shaft 134 (Fig. 19) in the anti-clockwise direction under the action of its spring 187 until the frame 133, strikes against the pin 188 on the right hand side wall of the totalizer casing, with the result that the toothed wheel set 134*a* moves out of engagement with the racks 135.

If now, for example, in the numeral wheels 183 a value has been registered and if through a succeeding addition a value has been registered which in certain denominations rotates the numeral wheels from "9" to "0" a tens transfer takes place in the manner, described in the following chapter "Tens carrying mechanism."

Tens carrying mechanism

Let it be assumed that in the third denomination from the right a value e. g. "6" has been registered by a preceding calculating operation. If now, a "5" is to be added, then in the rotation of the numeral wheel 183 (Fig. 20) of the third calculating place from "9" to "0", the tooth 189 (Fig. 24) arranged on the toothed wheel 185 acts on the nose 190 of the lever 191 and swings the same in the clockwise direction round the shaft 192. As soon as the nose 190 of the lever 191 acts upon the arm 193 of the lever 194 the latter is swung in the anti-clockwise direction round the shaft 195 against the action of the spring 196.

In the swinging movement of the three-armed lever 194 in the anti-clockwise direction, the nose 197 of the arm 198 of the three armed lever 194 slides along on the face 199 of the nose 200 of the pawl 201. As soon as the lug 197 of the arm 198 of the lever 194 slides off from the nose 199 of the pawl 201, the latter under the action of the spring 202 snaps over the lug 197 of the arm 198 so that the lever 194 is held in this position.

In the swinging movement of the three-armed lever 194 in the anti-clockwise direction, the lever 202*a* is swung in the clockwise direction round the shaft 203 in consequence of the connection 204, whereby the nose 205 of the lever 202*a* is moved on by one tooth division in front of the rack 135 of the next higher place.

In the swinging movement of the three armed lever 194 in the anti-clockwise direction, its arm 206 acts on the slide 207, which latter releases thereby the lug 208 of the rack 135.

If therefore the toothed sectors 19 are moved in the opposite direction of the arrow 140 towards their rest position in the manner hereinbefore described, the rack 135 of the fourth denomination from the right is released by the slide 207 and moved through one tooth division in relation to the sector 19 under the action, of the spring 209. The result of this is that the numeral wheel 183 corresponding to the fourth denomination is rotated further through one unit in the clockwise direction with which the tens transfer from the third to the fourth denomination has taken place.

Immediately after the disengagement of the totalizer wheels 134*a* with the racks 135, the nose 210 of the cam 211 acts on the nose 212 of the yoke 213, 214, 215 and swings the same round the shaft 216 against the action of the spring 217. Hereby the bridge 215 of the yoke 213, 214, 215 acts on the noses 218 of the levers 201 and swings the same round the shaft 219 in the anti-clockwise direction against the action of the spring 202, whereby the nose 199 of the lever 201 of the fourth denomination releases the nose 197 of the arm 198 of the lever 194. In consequence of this, the lever 194 is swung round the shaft 195 in the clockwise direction under the action of the spring 196, whereby it strikes against the pin 220 and takes up its normal position, shown in Fig. 20, in relation to the lever 201. In the swinging movement of the lever 194 in the clockwise direction, the lever 202*a* is swung in the anti-clockwise direction in consequence of the connection 204, whereby it acts with its nose 205 on the rack 135 of the fourth denomination and moves the same back against the action of the spring 209 into the normal position, illustrated in Fig. 20, in which the slide 207 snaps behind the lug 208 of the rack 135 and locks the same. Of course, the spring 196 must be stronger than the spring 209.

Retraction of the adjusting and indicating wheels to their right hand position

During the movement of the shaft 64 and of the adjusting and indicating wheels 57 to the left (seen in Fig. 15), the shaft 64 acts upon the forwardly directed arm 221 (Fig. 16) of the three-armed lever 222, whereby the three-armed lever 222 is rocked in the clockwise direction round the screw 223 against the action of the spring 224. Hereby the arm 225 of the three-armed lever 222 comes to lie in the moving path of the lever 226 (Fig. 18). As long as the key lever 4 is not depressed, the lever 226 is held in its normal position, shown in Fig. 18 by the spring 227. In this position the lever 226 is not capable of coacting with the arm 225 of the three-armed lever 222, nor with the nose 228 (Fig. 18) of the lever 117, because the normal position of the lever 226 as viewed in Fig. 16 is at the right hand of the lever 117.

On depression of the key lever 4, the same is rocked round the screw 85 (Fig. 10) in the clockwise direction. Hereby the lever 4 acts upon the projection 229 of the angle lever 230, which is rocked in the anti-clockwise direction round the shaft 231. Consequently, the connecting rod 232 (Fig. 16) is moved against the direction of the arrow 54, whereby the angle lever 233 is rocked round the screw 234 in the clockwise direction, so that the shaft 235 is moved to the left against the action of the spring 236. Hereby the lever 226, which is fixed on the shaft 235 comes in the moving path of the levers 225 and 117.

As soon as the printing operation has taken place, the projection 228 (Fig. 18) of the lever 117 acts upon the projection 237 of the lever 226, whereby the same is rocked against the action of the spring 227 in the anti-clockwise direction. Hereby the lever 226 acts with its surface 238 upon the arm 225 (Fig. 16) of the three armed lever 222, whereby the same is rocked in the anti-clockwise direction round the screw 223. Consequently, the arm 221 of the three armed lever 222 acts upon the shaft 64 so that the latter and the adjusting and indicating wheels 57 are moved to the right to their normal position. Since the bringing back of the adjusting and indicating wheels 57 takes place in the position of the driving cranks 117, 118 in which position the toothed actuator sectors 19 have already come to rest, it is possible to move the adjusting and indicating wheels 57 to the right through the tooth spaces of the toothed actuator sectors 19.

When the key lever 4 is released, whereby the same is rocked round the screw 85 (Fig. 10) in the anti-clockwise direction, the lever 230 is rocked round the shaft 231 in the clockwise direction, the connecting bar 232 (Fig. 16) moved in the direction of the arrow 54, the angle lever 233 is rocked round the screw 234 in the anti-clockwise direction and the shaft 235 is moved to the right under the action of the spring 236. Hereby the lever 226 comes again out of the path of movement of the crank lever 117 and of the arm 225 of the three-armed lever 222.

Coupling and driving mechanism for total taking

In a bracket 238 (Fig. 22) fixed in any suitable manner to the machine frame 33, a stub shaft 240 is rotatably mounted, which shaft is axially arranged to the shafts 12 and 116. On the stub shaft 240, a ratchet wheel 241 is rigidly mounted. The key lever 6 is mounted on the bolt 243 of a U-shaped part 244 (Fig. 8), which is mounted by means of screws 245 on the right hand side wall of the machine frame 33 and is normally maintained in its position by the spring 246 (Fig. 22) engaging on the one hand the hook 247 of the lever 6 and on the other hand the stationary bolt 248. The abutment or stop 249 contacting with the hook 247 of the lever 6 limits its pivoting action in one direction. The abutment or stop 249 is fixed to the machine frame by means of a bracket (not shown).

When the key 6, which is marked with "T" is depressed, the lever 6 being rocked on its pivot 243 clockwise, whereby the nose 251 of the pawl 252 is released by means of the rearwardly directed arm of the key lever 6. Since the pawl 252 is movable on the cam disc 253, which is rotatably mounted on the shaft 240, the pawl 252 is thus caused to move in the direction indicated by the arrow 254 by the compression spring 255 (Fig. 21). Consequently, the nose 256 of the pawl 252 engages with the continuously rotating ratchet wheel 241. The cam 253 is thus coupled with the ratchet wheel 241.

In order to maintain the cam disc 253 in its normal position shown in Figure 21, the cam 253 is secured to a disc 257 on which is rotatably mounted a roller 258 on the opposite side of the cam 253. The said roller 258 cooperates with the lever 259 which is also mounted on the bolt 243 and is always kept in contact with the roller 258 by a spring 260 secured to the lever 259 and also at 261 on the machine frame. Since the end of the lever 259 does not bear against the stop 249, the cam disc 253 will always be urged in the direction of the arrow 262 by the spring 260 acting through the lever 259, the roller 258 and the disc 257, while the rotation of the cam disc 253 is prevented by the lug 251 of the pawl 252 coming in contact against the end of the lever 6 and consequently the cam disc 253 is maintained in its normal position.

From the foregoing it results that if the key 6 is depressed and immediately released the disc 257 will perform one revolution only. The movement to the stub shaft 240 being transmitted through the levers 263, 264 from the stub shaft 112, which in its turn receives its driving movement from the coupling 182.

Prior to the completion of a revolution of the stub shaft 240, the roller 258 of the disc 257 comes in contact with the curved end of the lever 259 and rocks the same on its pivot 243 counter-clockwise against the action of the spring 260 engaging therewith until the roller 258 goes beyond the dead centre. From this moment the lever 259 exerts a driving action on the roller 258 and on the cam disc 253, whereby a rotary motion independent of the stub shaft 240 is imparted to the cam disc 253 and simultaneously effects a lead of the cam disc 253 relative to the stub shaft 240 and the ratchet wheel 241 respectively, thereby facilitating the uncoupling of the pawl 252 from the ratchet wheel 241.

Total taking mechanism

To the disc 257 described under the chapter "Coupling and driving mechanism for total-taking", is jointed a rod 265 (Figs. 21 and 8) by means of the pin 266 and this rod is in articulated connection with a lever 267 (Fig. 20) rigidly mounted on a shaft 268 which is rotatably mounted in the two side walls of the machine frame 33. On the shaft 268, further, a toothed segment 269 is rigidly mounted which is adapted to co-act with parts to be later described in detail.

On the toothed segment 268 is formed a nose 270 which is adapted to co-act with a nose 271 bent off at right angles on one arm of a bail 272, 273. The bridge 273 of the bail 272, 273 is adapted to co-act with the three-armed levers 184. When the segment 269 is rocked clockwise, the nose 270 rocks the bail 272, 273 anti-clockwise and maintains the same in its rocked position by means of the concentric part 274 of the segment 269, in which position the tens transfer levers 184 are locked for total taking.

On the lever 6 is formed a lug 275 (Figs. 16 and 20) which engages over the key lever 4 and is adapted to co-act with this key lever in a manner to be hereinafter described.

On the lever 6 (Figs. 16 and 26) is formed a nose 277 which is adapted to co-act with the forwardly directed arm of a two-armed lever 278. The two-armed lever 278 is pivotably mounted on an angle member 279 (Fig. 16) attached by means of screws 280 to the right hand side wall of the machine frame 33. On the rearwardly directed limb of the two-armed lever 276 is arranged a pin 281 (Fig. 23) which projects into a ring groove 282 of a ring groove sleeve 283. The ring-groove sleeve 283 is rigidly mounted on the shaft 125. By means of a spring 284 which on the one hand lies against the right-hand side wall of the machine frame and on the other hand lies against the ring groove sleeve 283. The normal position of the shaft 125 is determined by the striking of a collar 285 (Fig. 16) against the left hand side wall of the machine frame 33. Further, a driving wheel 124 (Figs. 16, 19 and 23) is fixed to the shaft 126 and is in engagement with a toothed wheel 120 arranged on the shaft 116, the wheel 120 being twice as broad as the toothed wheel 124 so that the toothed wheel 124 remains in engagement with the toothed wheel 128 when the shaft is displaced in the arrow direction 286 (Fig. 16) in a manner to be hereinafter described.

Besides the cam 126 for addition, a second cam 127 for total taking is mounted on the shaft 125 which is constructed as shown in Fig. 23 and is adapted to cooperate with the totalizer controlling lever 138.

In the shaft 182 (Figs. 20 and 24) is located a half round groove in which a rotatable key 287 is laid, and this key is recessed in the zone of the wheels 185 at 288 corresponding to the arc of the circumference of the shaft 182 so that the arc-shaped face 286 and the remaining circum-

ference of the shaft 192 form a closed cylindrical surface. At the left-hand end is provided a second short face 289 displaced in relation to the face 288. The face 289 on the displacement by rotation of the rotatable key 287 in the opposite direction to the arrow 290 being likewise adapted to form a cylindrical surface with the remaining surface of the shaft 192. In the normal or home position (Figs. 24 and 27) of the shaft 192, the edge of the face 289 of the rotatable key 287 lies on the locking edge 291 of the hole 292 in the left hand side wall of the totalizer frame 133.

The shaft 192 is provided with collars 293. On each pair of such collars runs a wheel 185 which is provided in its bore 294 with a cam 295. This lies in the ring groove 296 formed by each pair of collars.

If the rotatable key 287 is located in the normal or home position illustrated in Figs. 24 and 27, the wheels 185 can freely rotate in each direction since the cams 295 lying in their bores 294 can freely rotate past the rotatable key 287.

On the right-hand side wall of the totalizer frame 133 the shaft 192 is mounted with its reduced journal 297 in the hole 298. This hole is provided with a recess 299 (Fig. 25). In the same is provided a locking cam 300 (Figs. 24, 25, 27 to 29) which is adapted to co-act with the rotatable key 287 on rotation of the shaft 192 in the arrow direction 290. The right-hand end 297 of the shaft 192 projects through an elongated hole 301 of the right-hand side wall 302 of the totalizer casing.

On the journal 303 of the shaft 192 is fixed a toothed wheel 304 which is capable of being driven by the toothed segment 269 (Fig. 20) in the arrow direction 290 (Figs. 24, and 27 to 29) when the segment 269 is swung in the arrow direction 305 (Fig. 20).

The shaft 125 (Fig. 16) is provided with ring grooves 306 and 314 with which a pawl 307 (Fig. 16 and 19) is capable of engaging, the pawl being swingably mounted on a pin 308. The pin 308 is fixed to a bracket (not shown) arranged on the machine frame in any suitable manner. By means of a torsion spring (not illustrated) the pawl 307 is acted upon so that it is laid upwards against the shaft 125. The other end of the pawl 307 is adapted to co-act with a cam 309 arranged on the shaft 116.

Total taking

If, for example, a total is to be taken from the six denomination totalizer 17 (Fig. 1), first of all, the totalizer is brought into the working position and the total key 8 (Fig. 22) is depressed whereon the following operation occurs:

By depressing the key 8 of the key lever 6 the coupling 241, 292 is closed, as described under the chapter "coupling and driving mechanism for total taking."

On depression of the total key 6 the incline 277 (Figs. 16 and 26) formed on the key lever 6 acts on the lever 276, whereby the latter is swung round the screw 318 in the clockwise direction. As a result, the ring groove sleeve 283 (Figs. 23 and 16) arranged on the shaft 125, the toothed wheel 124, the two cams 127, 128 and the shaft 125 itself are moved in the arrow direction 286 against the action of the spring 284, whereby the cam disc 128 moves out of the working position in relation to the nose 129 of the lever 130 and the cam 127 moves into the working position with the nose 129 of the lever 130. At this moment the horizontal limb of the pawl 307 springs into the ring groove 306 of the shaft 125 and holds the parts 283, 124, 127, 128 arranged on the shaft, in the displaced position.

In the swinging of the lever 276 in the clockwise direction round the screw 318, the part 311 formed as shown in Fig. 26 is acted upon to the left whereby the face 312 of the part 311 is laid over the key lever 4, depressed through the lug 275 of the depressed total key lever 6. Consequently, on the release of the total key 8 the lever 4 is prevented from returning to its normal position.

As has been explained under the chapter "Operation of the drive for the adding and printing mechanism" on depression of the lever 4, the coupling 102 is closed and the shaft 12 commences to rotate in the arrow direction 22.

During the rotation of the coupling 102 and the shaft 12 in the arrow direction 22, the shaft 116 (Fig. 15) is driven in the direction of the arrow 115 by means of the parts 108 (Fig. 22) 112, 113, 114 in which rotation the toothed wheel 120, arranged on the shaft 116 also participates. Since the toothed wheel 120 (Fig. 19) is in engagement with the toothed wheel 124, the cams 127 and 128 are rotated in the direction of the arrow 128. Hereby the raised part of the cam 127 (Fig. 23) acts on the nose 129 of the lever 130 and swings the same in the anti-clockwise direction round the shaft 180 against the action of the spring 181. The nose 131 of the lever 130 hereby acts on the lug 132 of the totalizer frame 133, whereby the same is swung round the shaft 134 (Fig. 20) in the clockwise direction against the action of the spring 187 so that the toothed wheels 134a move into engagement with the teeth of the racks 135.

As described above under the chapter "Coupling and driving mechanism for total taking," the shaft 240 is coupled with the discs 253, 257 on the depression of the total taking key 8. On the beforementioned movement of the parts 108, 112, 113, 114, the shaft 240 and the parts 253, 257 coupled therewith are driven in the arrow direction 115 by the parts 112, 284, 283 (Fig. 22).

By this rotation of the disc 257 (Fig. 22) the connecting rod 265, jointed to it by means of the pin 266, is actuated and swings the lever 267 (Fig. 20) which is jointed to it and which is rigidly mounted on the shaft 286, in the clockwise direction. In the swinging movement of the lever 267 participitates also the toothed segment 269 rigidly mounted on the shaft 286 and this toothed segment in one revolution of the disc 257 is swung once to and fro. At this point it may be mentioned that the disc 257 only makes one revolution. Directly at the commencement of the actuation of the segment 269 the projection 270 arranged on the same acts on the nose 271 of the bail 272, 273 and swings the same in the anti-clockwise direction whereby the bridge 273 of the bail 272, 273 is laid upwards against the lever 194. Thereby the levers 194 are locked so that the tens transfer levers 190 are held in the path of the tens transfer cams 189 (Fig. 24) of the toothed wheels 185. The tens transfer levers 190 are held in this position by the reciprocating cam running concentrically with the pivot of the segment 269.

The segment 269 in its swinging movement in the arrow direction 305 drives the wheel 304 (Fig. 24) lying opposite to it in the arrow direction 290, whereby the shaft 192 is likewise rotated in the arrow direction 290 from the position ac-

cording to Fig. 27 to the position according to Fig. 29, which movement is approximately through 340 degrees of the released revolution. In this rotation the control cam 291 of the hole 292 of the left hand side wall of the totalizer frame acts on the surface 289 of the rotatable key 287, whereby the same is rotated in the opposite direction to the arrow 290. Consequently, the edge 313 of the part 288 of the rotatable key 287 moves out from the periphery of the shaft 192 and acts as driver for the cams 295 of the wheels 185, whereby these and the numeral wheels 183 in connection with them are carried back to zero. The zeroizing is finished as soon as the edge 313 of the rotatable key 287 strikes on the cam 300 (Fig. 29) located in the recess 299 of the right hand side wall of the totalizer frame.

Simultaneously in this zero position of the wheels 185, the tens transfer cams 189 (Figs. 24 and 29) of the wheels 185 strike against the noses 190 of the tens transfer levers 191, which levers 191 are brought to their working position with regard to said transfer cams 188 and locked in the same in the manner above described. Thereby an over-shooting of the reset wheels 185 and the number wheels 183 is prevented.

Since the shaft 192 does not make a complete revolution but is rotated only through 340 degrees, the shaft 192 does not come to its home position according to Fig. 27. The lock 289, 291 may only be operated when the resetting parts are in the home position according to Fig. 27, while the lock 289, 191 is prevented from action by the coaction of the face 289 of the rotatable key 287 with the inner circumferential face of the hole 292 of the totalizer casing 133, when the resetting process is finished in the position according to Fig. 29. Accordingly, in this position the resetting shaft 192 is released for the return movement in the opposite direction of the arrow 290 (Fig. 29).

At this moment, the segment 269 has finished its swinging movement in the arrow direction 305, whereby the connecting rod 265 is in its second dead point position.

As soon as the engagement of the totalizer has taken place, the toothed sectors 136 and 137 (Fig. 15) are acted upon in the arrow direction 140 by way of the levers 118 and 113. Since the member 138 is attached to the toothed sectors 136 and 137 this member also travels in the arrow direction 140, whereby the noses 139 of the actuator sectors 19 are released and consequently the actuator sectors 19 are unlocked. In this operation the toothed segments 141 and 142 which are in engagement with the toothed sectors 136 and 137 are swung round the shaft 64 in the clockwise direction in which swinging movement the beam 76 projecting into the recesses 143 and 144 of the toothed segments 141 and 142 also participates.

In the swinging movement of the beam 76 in the clockwise direction round the shaft 64 the beam remains inoperative on the adjusting and indicating wheels 57, since these are in their normal or right hand position illustrated in Fig. 16.

In the rotation of the wheels 195 (Fig. 24) in the arrow direction 290, the segments and type-printing rods 19 (Fig. 20) are displaced in the arrow direction 140 by way of the toothed wheels 134a corresponding to the amount registered in the totalizer. Over-shooting of the zeroized wheels 185 (Fig. 28) in the arrow direction 290 is prevented by the previously locked tens transfer levers 194.

Now, in the rotation of the shaft 116 (Fig. 14) the roller 147 of the lever 148 slides from the raised part of the cam 148 to the lower part of the same, whereby the yoke 153, 154, 155 is swung round the shaft 156 in the anti-clockwise direction into the position illustrated by dotted lines by way of the parts 150, 179, 152 so that the type hammers 157 are released.

After one-half of a revolution of the main drive shaft 12 the coupling casing 102 and the mechanisms in connection with it have come to rest as above described under the chapter "Operation of the drive for the adding and printing mechanism."

Now the printing mechanism is actuated as described under the chapter "Operation of the printing mechanism."

As soon as the zeroizing of the wheels 185 of the totalizer located in the working position or the printing of the total has been effected, the nose 129 (Figs. 19 and 23) of the two-armed lever 130 slides off from the raised part of the cam 127, whereby the lever 130 is swung in the clockwise direction under the action of the spring 181. In consequence of this the totalizer frame arranged in the totalizer casing can now swing round the shaft 134 in the anti-clockwise direction under the action of the spring 187, the swinging movement being limited by the striking of the side part of the totalizer frame against the pin 188 arranged on the totalizer casing. In the swinging of the totalizer frame in the anti-clockwise direction round the shaft 134 the toothed wheels 134a are disengaged from the teeth of the racks 135, whereby the driving connection of the racks 135 with the totalizer located in the working position is interrupted.

As soon as the nose 129 of the lever 130 has again moved from the raised part of the cam 127 on to the lower part of the same, the cam 309 acts on the pawl 307 and swings the same round the pin 308 in the clockwise direction against the action of the torsion spring (not illustrated) whereby the horizontal arm of the pawl 307 moves out of the ring groove 306 of the shaft 125 and accordingly the shaft 125 and the parts 283, 124, 127 and 128 (Fig. 23) arranged on it, are moved back under the action of the spring 284 against the arrow direction 286.

Thereby the pawl 307 comes in engagement with the ring groove 314 of the shaft 125, whereby the shaft 125 and the parts 283, 124, 127, 128 (Fig. 23) fixed to the same are stopped in their return movement before said parts have come to their final home position. In this position the nose 129 of the lever 130 is in working position to the part 310 connecting the cams 127, 128 the radius of which part 310 corresponds to the lower part of the cams 127, 128.

In the swinging of the lever 278 in the anti-clockwise direction under the action of the spring 284, the face 312 of the part 311 also releases the key lever 4, whereby the key lever 4 under the action of its spring 86 is rocked round the screw 85 in the anti-clockwise direction into its position illustrated in Fig. 10, so that the coupling casing 102 again participates in the further rotation of the shaft 12 as above described under the chapter "Operation of the drive of the adding and printing mechanism."

For the remainder, the operations hereinbefore described occur for which reason these shall not be described further. Similarly the parts 158,

160, 161, 162, 147, 148, 149, 150, 152, 153, 154, 156 are returned to their rest position in the manner above described, under the chapter "Operation of the printing mechanism."

In said further rotation of the coupling casing 102 in arrow direction 22 the toothed sectors 136 (Fig. 15) and 137 during the second half of the revolution of the levers 117 and 114 are moved by way of the levers 118 and 113 through the intermediary of the parts 108, 112 in the opposite direction of the arrow direction 140, whereby the toothed segments 141 and 142 standing in engagement with the toothed sectors 136 and 137 are acted upon round the shaft 64 in the anti-clockwise direction, whereby the beam 76 is likewise swung in the anti-clockwise direction into the normal position.

Besides the actuator sectors 19 are naturally also brought back into the rest position by the beam 136 fixed to the toothed sectors 136 and 137 in consequence of its action on the noses 139 of the actuator sectors 19.

During said second half revolution of the parts above described, the pawl 307 slides upon the raised part 315 of the cam 309. During this movement the lever 130 is held in working position with regard to the part 316 of the cams 127, 128 by the co-action of the pawl 307 with the ring-groove 314 in the manner above described. Since the radius of the part 316 corresponds to the lower part of the cam 127, 126, the lever 130 may not be operated by the part 316 during this second half revolution of the machine parts including the shaft 125. Accordingly the wheels 134 of the totalizer do not come in engagement with the toothed sectors 135 of the printing sectors 19. Consequently it is not possible to bring the value which was cancelled in the totalizer again into the same by the above mentioned return movement of the printing sectors 19, which is effected during the second half revolution of the machine part.

Shortly before the completion of the second half revolution of the machine parts including the shaft 116 and the cam 309 fixed upon the shaft 116, the cam 309 acts with its raised part 317 upon the pawl 307 and rocks the same against the action of its torsion spring further in the clockwise direction. Thereby the pawl 307 comes out of engagement with the ring groove 314 of the shaft 125. Consequently, the shaft 125 and the parts 293, 124, 127 and 126 fixed thereon are moved back under the action of the spring 264 in the arrow direction 288 to the home position (Fig. 16). In this position the lever 130 is again in working position with regard to the adding cam 126.

As described under the chapter "Coupling and driving mechanism for total taking," the coupling of the shaft 240 with the cams 253, 257 for one revolution is effected, whereby on the revolution of the disc 257 the parts 265, 267, 260, 269 are also operated. Thereby the toothed segment 269 is moved back in the opposite direction of the arrow 305 during the second half revolution of the disc 257, whereby the same operates the toothed wheel 304 and therewith the resetting shaft 192. Thereby the wheel 304 and the resetting shaft 192 are moved back from the resetting position according to Fig. 29 to the home position according to Fig. 27. This is possible, since the lock 289, 291 may not be effective in the resetting position as described further above. The gearing parts of the totalizer including the number wheels 183, which are reset to zero position by the resetting shaft 192 do not take part in the return movement of the shaft 192, since the friction of their bearings and teeth are greater than the bearing friction of the shaft 192. At the end of the return movement of the shaft 192 in the opposite direction of the arrow 290 the face 286 of the rotatable key 267 is influenced by the cam 300 (Fig. 27) whereby the lock 289, 291 is again effected. In this home position (Fig. 27) the resetting shaft 192 cannot be rotated in the opposite direction of the arrow 290. At the end of said return movement of the parts 253, 257, 265, 268, 269, that is, after one revolution of the discs 253, 257 the coupling 252, 141 (Fig. 22) is again released as described under the chapter "Coupling and driving mechanism for total taking." In the home position of the segment 269 (Figs. 20 and 27) which is attained by return movement of the same, the bridge 271, 273 is again released from the part 274 of the segment 266, whereby the lock 194 described above for holding the tens transfer lever 190 is again released.

Shortly before the completion of a revolution of the coupling casing 102 (Fig. 10) the nose 93 of the coupling pawl 94 acts on the nose 101 of the part 98 which as has already been mentioned after the release of the addition key 84 was moved with its nose 101 into the path of movement of the nose 93 of the coupling pawl 94. In consequence of this, the coupling pawl 94 is swung around the pin 105 in the clockwise direction against the action of the spring 103 so that the nose 106 of the coupling pawl 94 moves out of engagement with the cam 107, so that the coupling casing no longer participates in the revolution of the main drive shaft 12 and the mechanisms are held in their rest position.

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