

Nov. 21, 1933.

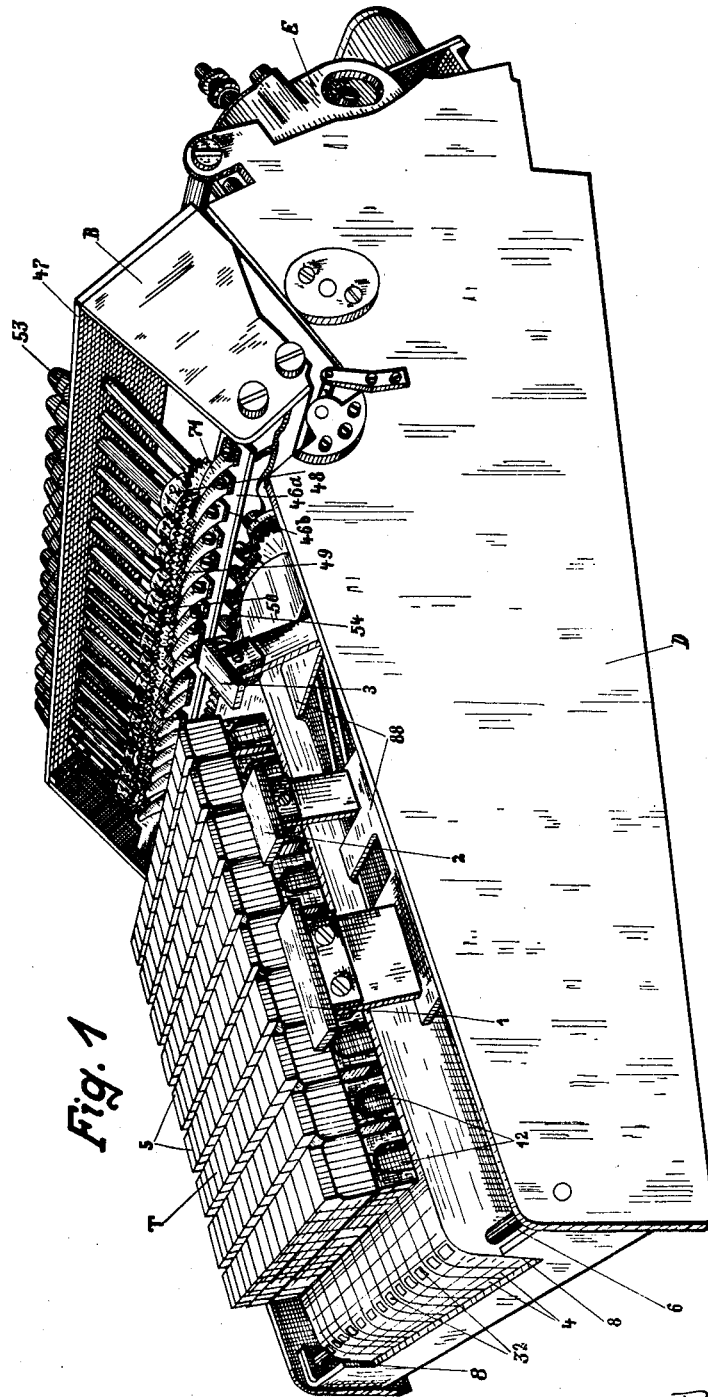
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1,935,858

DRIVING MEANS FOR CALCULATING MACHINES

Filed July 31, 1930

11 Sheets-Sheet 1



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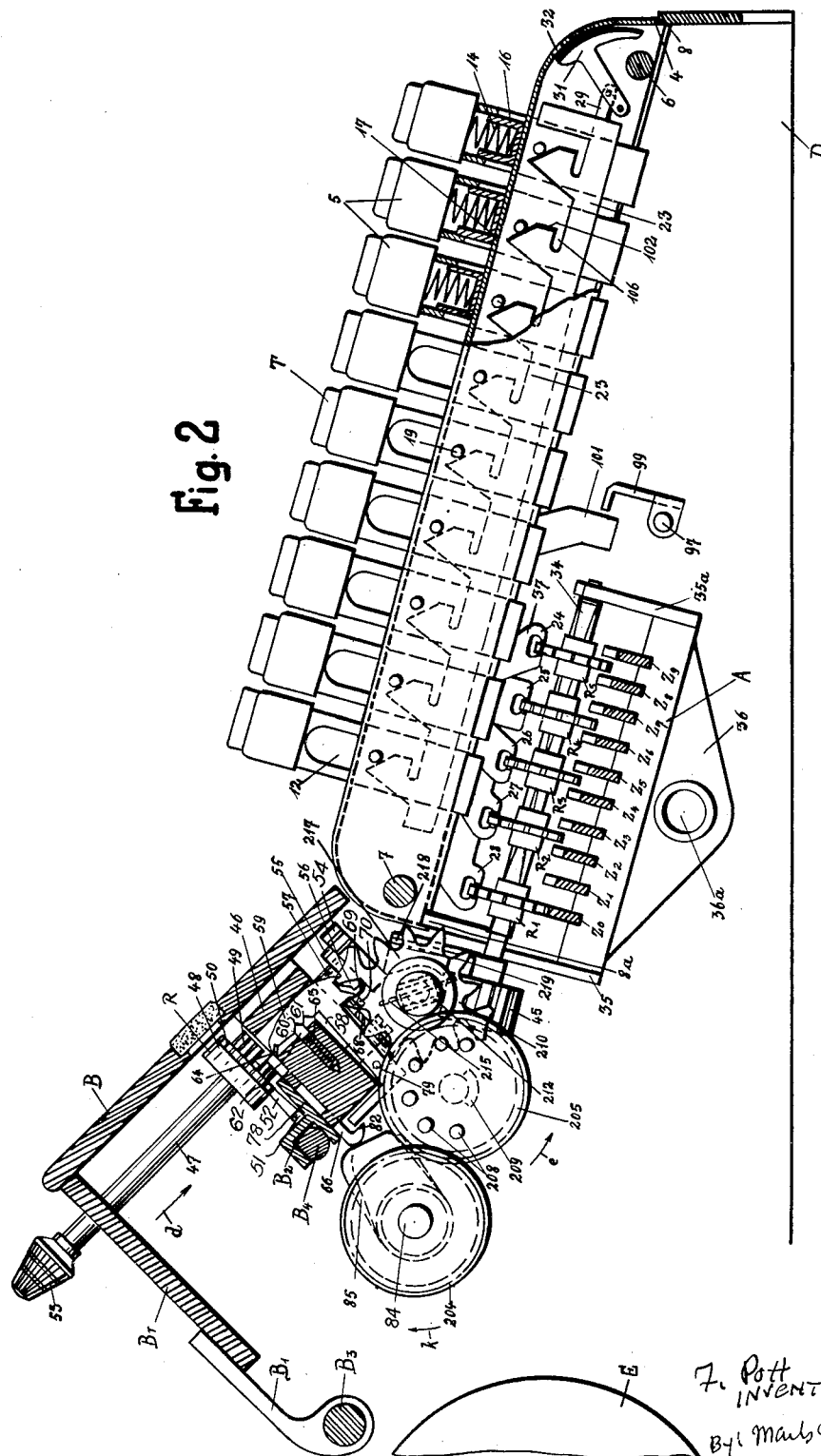
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DRIVING MEANS FOR CALCULATING MACHINES

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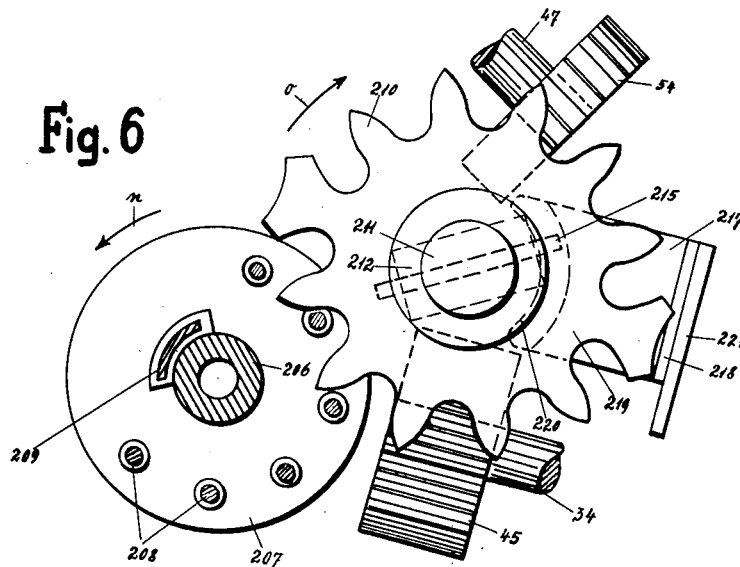
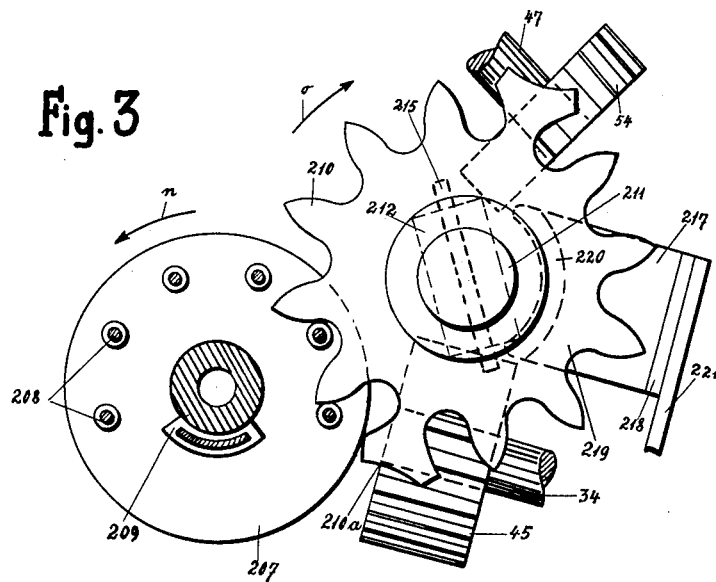
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DRIVING MEANS FOR CALCULATING MACHINES

Filed July 31, 1930

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DRIVING MEANS FOR CALCULATING MACHINES

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Fig. 4

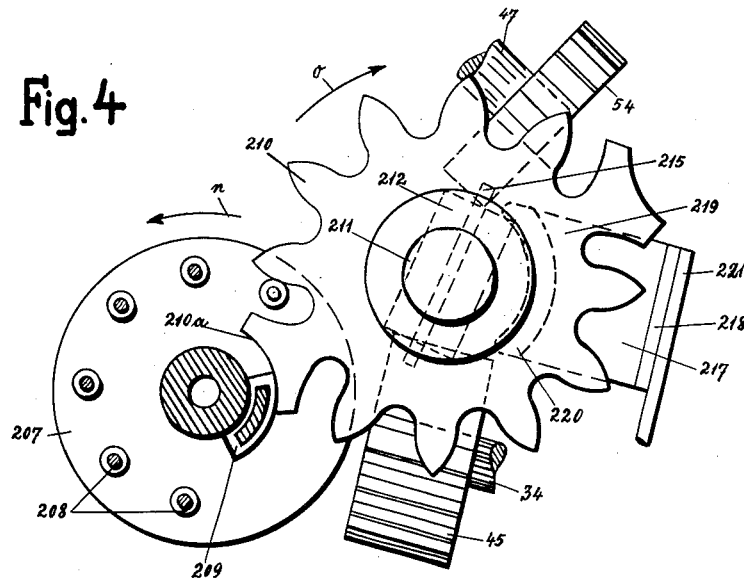
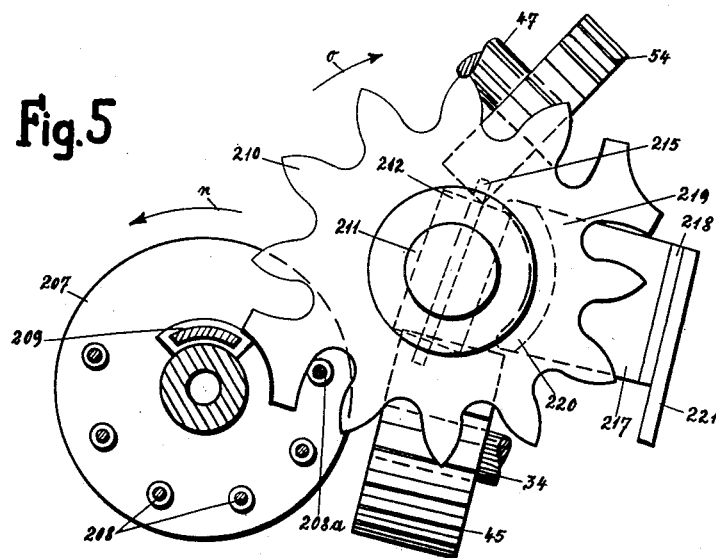


Fig. 5



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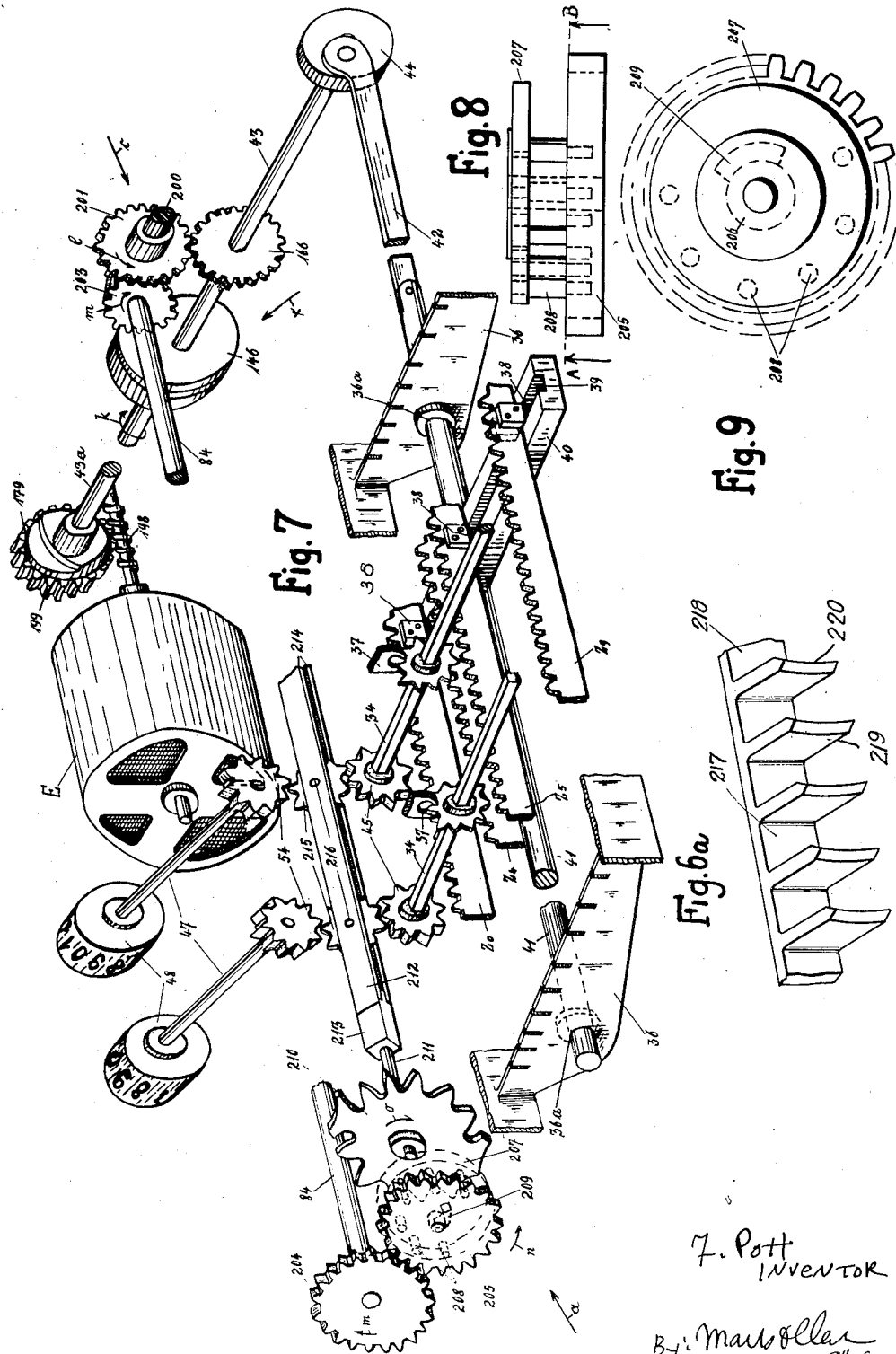
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DRIVING MEANS FOR CALCULATING MACHINES

Filed July 31, 1930

11 Sheets-Sheet 5



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DRIVING MEANS FOR CALCULATING MACHINES

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11 Sheets-Sheet 6

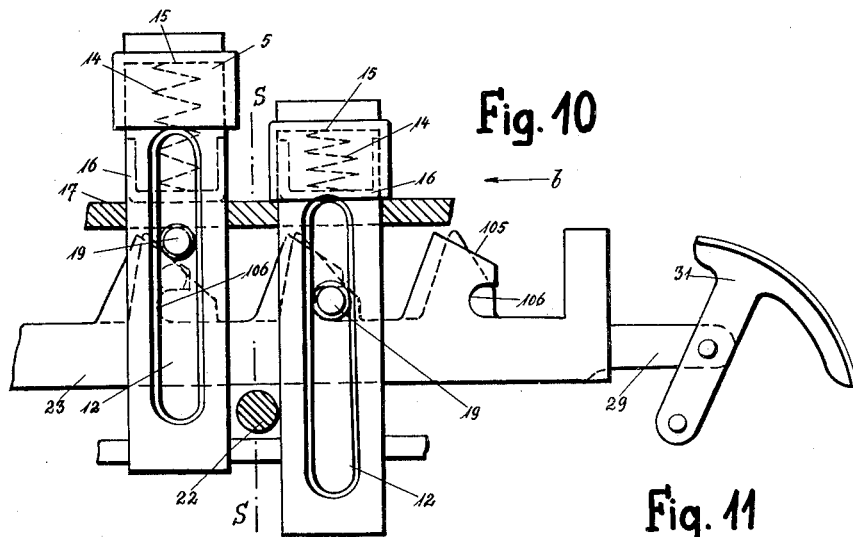


Fig. 10

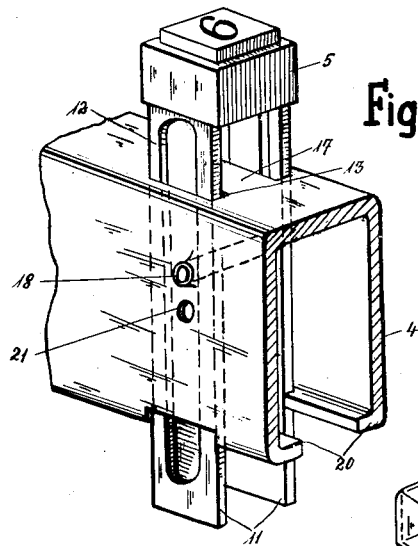


Fig. 11

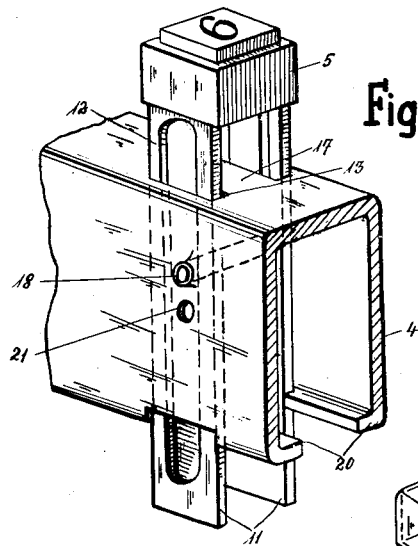


Fig. 12

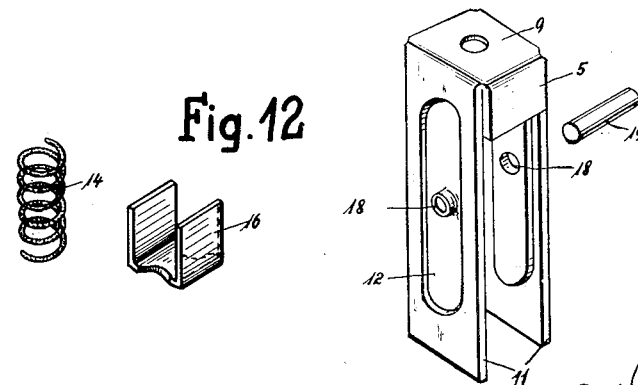


Fig. 13

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DRIVING MEANS FOR CALCULATING MACHINES

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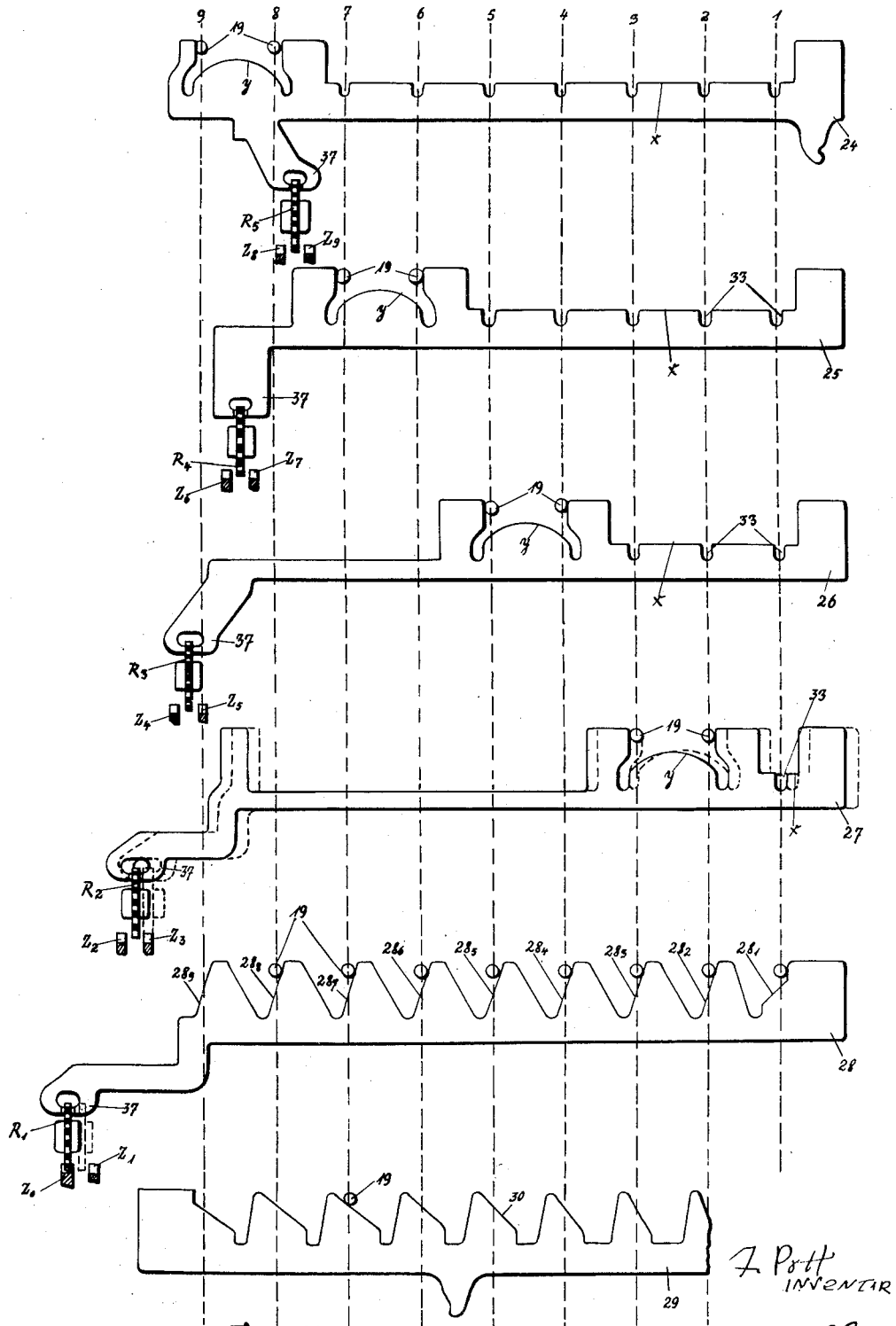


Fig. 14

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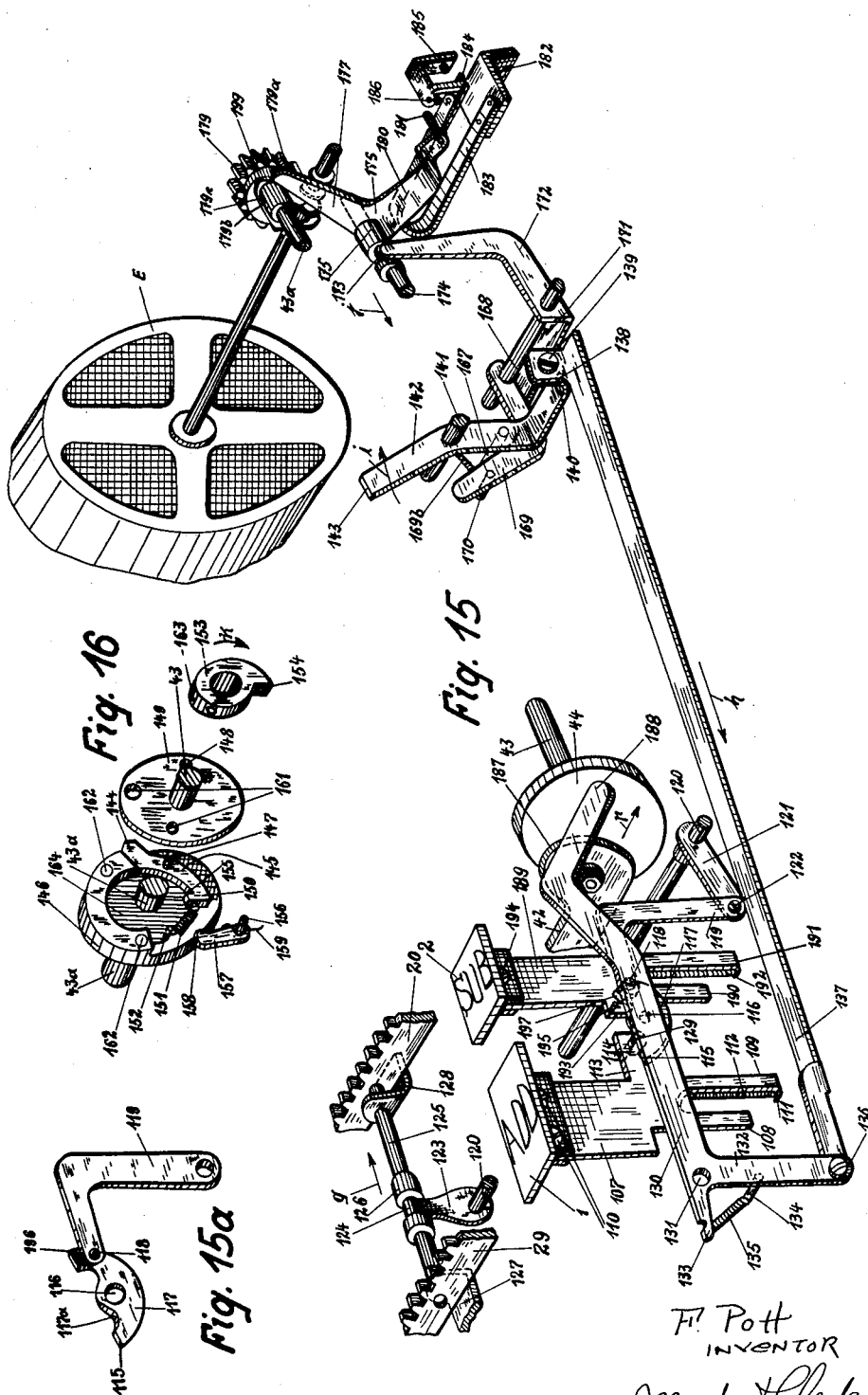
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DRIVING MEANS FOR CALCULATING MACHINES

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DRIVING MEANS FOR CALCULATING MACHINES

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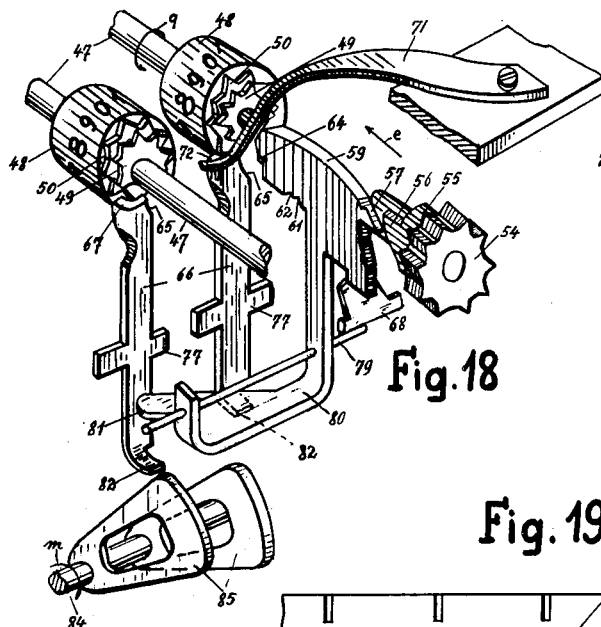


Fig.18

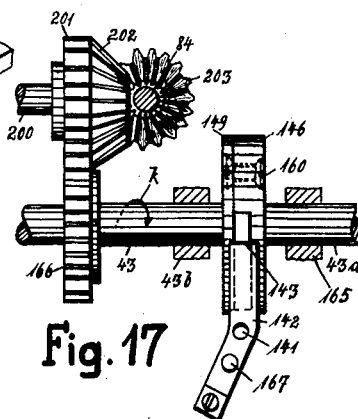


Fig. 17

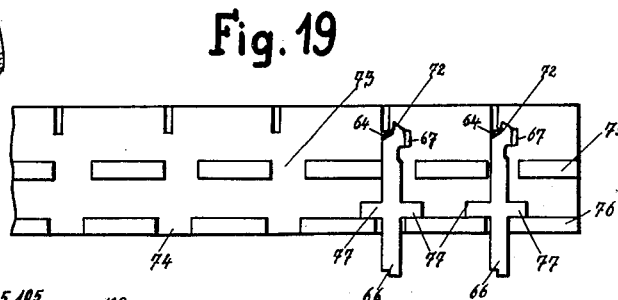


Fig. 19

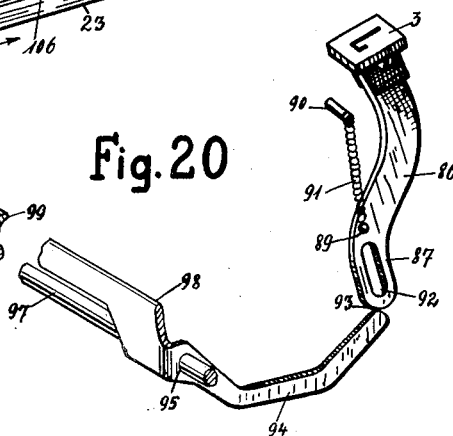
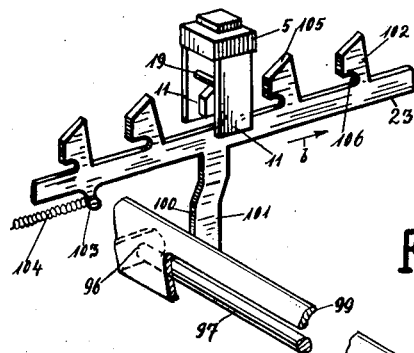


Fig. 20

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DRIVING MEANS FOR CALCULATING MACHINES

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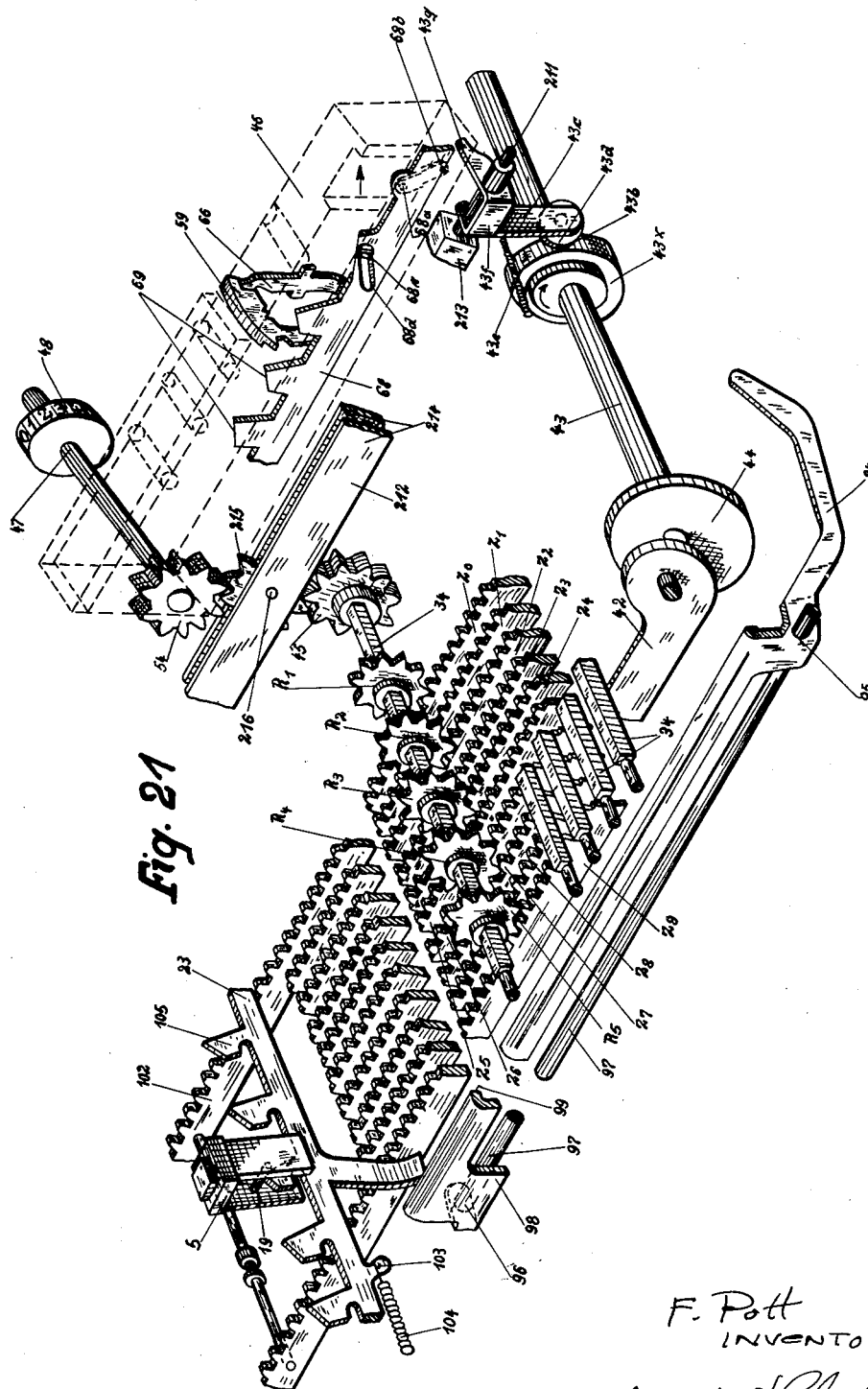


Fig. 21

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Fig. 22

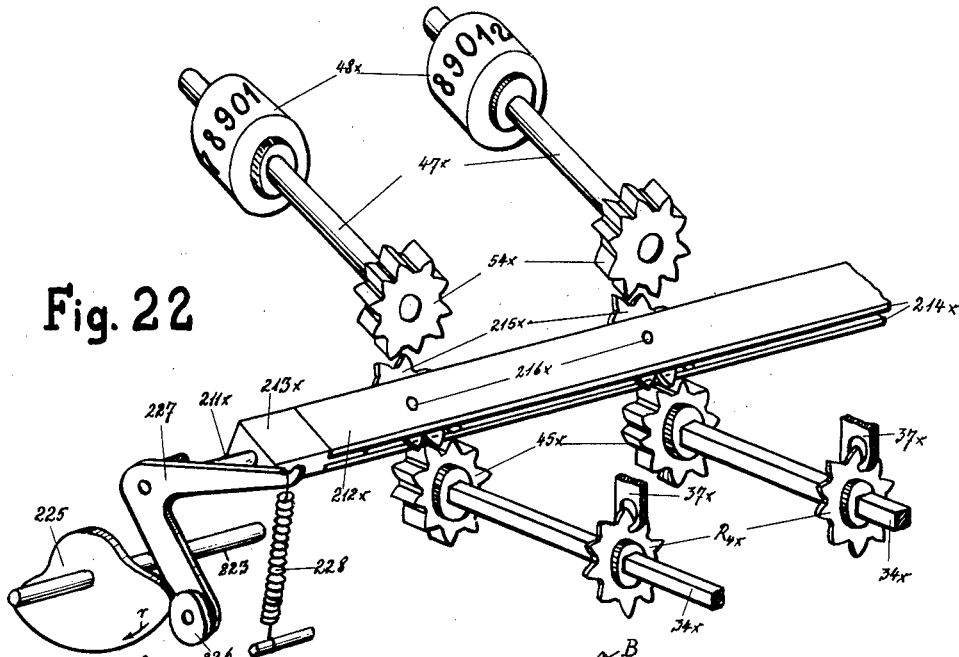


Fig. 23

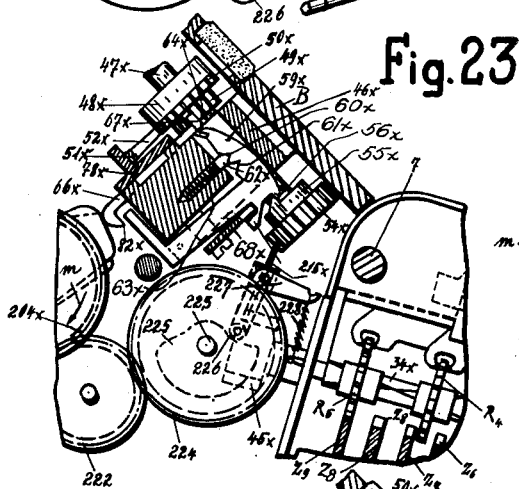
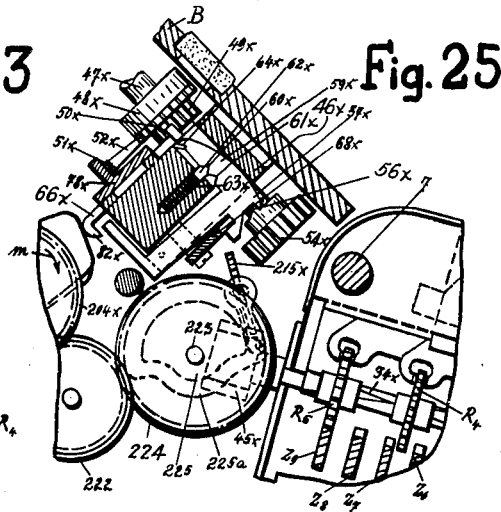


Fig. 25



UNITED STATES PATENT OFFICE

1,935,858

DRIVING MEANS FOR CALCULATING
MACHINES

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Application July 31, 1930, Serial No. 472,084, and
in Germany August 8, 1929

5 Claims. (Cl. 235—62)

This invention has reference to driving means for the counting mechanism in calculating machines in which value transferring means which are operated to correspond to the adjusted values are coupled to value receiving means by suitable intermediate members. Such driving mechanisms have been disclosed heretofore in various forms of construction, and as heretofore disclosed they comprise substantially coupling means adapted to temporarily connect the counting shafts with the feeding shafts during the period of the transmission of values. In devices of the kind referred to and as heretofore constructed the coupling connection of the shaft was effected by means of coupling gear wheels disposed in a common frame and the depth of the gear wheels was adjusted in such a manner that they became adapted to connect the axially aligning and oppositely and adjacently disposed gear wheels of the counting mechanism to the shafts of the feeding mechanism. The frame carrying these coupling gear wheels in the device referred to was raised for the purpose of coupling and uncoupling of the feeding and counting shafts and respectively lowered, so that the coupling gear wheels were radially engaged and disengaged with the gear wheels of the counting shafts and of the feeding shafts. The raising and lowering action of the frame was effected by means of a link parallelogram or the like which was operated by means of a cam disc controlled by the driving means of the device.

With this machine as heretofore constructed there was the difficulty that, as a result of the depth of the coupling wheels the entire coupling mechanism became comparatively heavy, so that considerable weights had to be moved and in consequence thereof it was not possible to increase the calculating speed in any desired ratio and in accordance with the requirements of modern mechanical counting operations. Then, there was the additional inconvenience that the shafts of the feeding mechanism and of the counting mechanism had to be coaxially and aligningly disposed, so that the counting mechanism and the feeding mechanism had to be arranged in one and the same horizontal plane.

These difficulties are avoided in accordance with this invention by providing for a rockable arrangement of the intermediate coupling members, so as to move them into the operative position by means of a simple rocking movement. In further pursuance of the invention the coupling members are preferably disposed at right angle to the rotating movement of the value trans-

ferring and value receiving shafts by means of a rotatable carrying bar, rod, shaft or the like.

The invention will be more particularly described by reference to the accompanying drawings showing by way of exemplification two forms of embodiment of the principles of the invention. In the drawings Fig. 1 is a perspective front view of the machine according to the invention with the protective casing removed. Fig. 2 is a cross sectional view through the calculating machine and with parts shown in elevation and provided with the feeding mechanism with proportional lever operated drive which has been heretofore used in connection with the Mercedes-Euclid calculating machine, the casing for the result counting mechanism and the beam in which the tens-transmission members are disposed having been shown in section for the sake of clearness.

Figs. 3 to 6 are illustrations of the several operating stages of the driving and coupling mechanisms for effecting the coupling between the feeding and counting mechanisms, these parts being shown on an enlarged scale with the pin wheel 207 being represented as seen along the section line A—B of Fig. 8 in the direction of the arrow, while the other parts are shown in elevation in the direction of the arrow "a" of Fig. 7. In these figures the position of rest of the driving mechanism is shown in Fig. 3, while Fig. 5 illustrates the position of the driving and coupling mechanisms immediately after the coupling operation has been effected. Fig. 5 shows the position of the driving and coupling mechanisms directly before the uncoupling operation. Fig. 6 is an illustration of the uncoupling operation. Fig. 6a is a perspective view of details in Figs. 3 to 6. Fig. 7 shows the driving and coupling mechanisms in perspective view and corresponding to the inoperative position according to Fig. 3 of the drawings. Figs. 8 and 9 are illustrative of a detail according to Figs. 2 and 7 showing particularly the driving means proper in Fig. 8 in side view and in Fig. 9 in plan view. Fig. 10 is a side view, showing a depressed key and a non-depressed key and the key locking bar which is arranged in the key frame, and the bar for the actuation of the indicating or recording mechanism. Fig. 11 is a section through the key frame on the line S—S of Fig. 14 in the direction of the arrow b. Fig. 12 shows the details associated with one of the keys. Fig. 13 is a perspective view of a key mounted in the key frame and in the non-depressed position. Fig. 14 illustrates the several adjusting and setting bars and the

indicating bar and below each other, showing the juxtaposition of these parts as seen in Fig. 11 from left to right and which are preferably employed in connection with the well known

5 Mercedes-Euclid-calculating machine.

Fig. 15 is a perspective view of the adding and subtracting mechanisms and of the closing and opening means for the motor contacts operated thereby. Fig. 15a is a detail according to Fig. 15 in perspective view. Fig. 16 is a perspective view of the driving coupling, as seen in the direction of the arrow "x" of Fig. 7. Fig. 17 is an elevation of the driving coupling and of the main driving shaft, as seen in the direction of the arrow "c" of Fig. 7. Fig. 18 shows the tens transmitting mechanisms of Fig. 2 in perspective view, with the number rolls somewhat spaced from each other for the sake of clearness of understanding, while parts which would encumber the drawings without aiding in the understanding of the parts have been left out in this figure. Fig. 19 is an elevation as viewed towards the supporting beam of the tens transmission mechanisms in the direction of the arrow "d" of Fig. 2 and with the covering bar being left out for the purpose of exposing the tens-slides and their guides. Fig. 20 is the cancelling mechanism for the teeth in perspective view. Fig. 21 is a perspective view of the locking bar for the arresting of the tens preparing slides and of the driving means thereof.

In Figs. 22 to 25 I have shown another modified form of construction of the subject matter of the invention. Of these Fig. 22 is a perspective view of the driving and coupling mechanisms in the position of rest. Fig. 23 is a cross section through a calculating machine according to Fig. 2 and combined with driving and coupling mechanisms according to Fig. 22 in the operative position. Fig. 24 is a view according to Fig. 23 at the time of the driving and coupling mechanisms having become disengaged from each other. Fig. 25 represents the same modification shown in Figs. 22 to 24 and with positively operating controlling means for the rocking bar carrying the coupling mechanisms, the parts being shown in the position according to Fig. 24.

The automatic Mercedes-Euclid-calculating machine, as is well known, comprises setting and adjusting means A (Fig. 2), a casing B for the result counting mechanism, the result counting mechanism R itself, the key board T, disposed above the setting means A, the frame D and the motor E arranged on the right hand side of the rear portion of the machine. The result counting casing B is rigidly secured to the rods or bars B₃ and B₄. On the right hand side of the machine there are mounted the adding key 1 (Figs. 1 and 15), the subtracting key 2 and the cancelling key 3 (Figs. 1 and 20) for the key board T.

This key board T (Figs. 1 and 2) comprises a plurality of adjacently disposed key carrying frames 4 (Fig. 2) which are provided with vertically displaceable keys 5. The front end of the key frame 4 is traversed by a shaft 6 which is journalled in the two side walls of the machine frame D. Upon the rear side of the machine the key frames 4 are secured to the machine frame D by means of a shaft 7 journalled in the two side walls of the machine. The key frames 4 are secured at their front and rear ends against lateral displacement along the shafts 6 and 7 by the edges 8 and 8a (Figs. 1 and 2) of the machine frame.

The keys 5 (Fig. 12) constitute a prismatic hollow structure upon the closed top surface 9

of which the particular number or figure is shown by applying thereto a special box like numbering section 10. The body part of the key comprises two legs 11 with flutings or depressions 12 imparting to them an increased rigidity. With these legs 11 the body parts of the keys project through the apertures or recesses 13 of the key frames 4 (Fig. 13). In the upper part of the key 5 the key springs 14, constituting compressing springs are arranged (Figs. 2, 10, 11 and 12). These springs at their upper ends rest directly against the upper surface 15 of the key body and at their lower ends upon a protective staple 16 which is provided for the purpose of covering up the springs on the open sides of the key body. This yoke-like staple rests against the upper surface 17 of the key frame 4. The legs 11 of the key are provided with opposite aligningly disposed holes 18 in which the key studs 19 are loosely inserted. The dropping out of the studs 19 is prevented by the two side walls 20 of the key frame 4 (Fig. 13). These legs 20 are moreover provided with additional bores or apertures 21 at about half the height of the key-stroke, these bores being provided for the reception of the studs 19 during the assembling of the parts. With a view of increasing the supporting surface in the legs 11 of the key which are made of very thin sheet metal, the apertures 18 are substantially I-shaped, as appears from Fig. 12 of the drawings.

Underneath the key studs 19 the parts to be operated are arranged, that is to say the locking bar 23 (Figs. 10 and 11), the adjusting and setting bars 24 to 28 (Figs. 11 and 14) and the bar 29 for the actuation of the indicating or recording means (Figs. 10, 11 and 14). All these parts are retained in position laterally by the depressed or milled parts 12 of the keys 5 and are disposed so as to slide at their lower ends upon pins or studs 22 loosely disposed in the key carrier between the keys. The indicating or recording bar 29 is provided in the well known manner with recesses with inclined surfaces 30 by means of which the indicating bar 29 is displaced upon the depression of the key stud 19 and as a result of this predetermined displacement the bar 29 operates an indicating segment or sector 31 in the well known manner which by means of a peep hole 32, Figs. 1 and 2, uncovers the adjusted figure. The setting or adjusting bars 24 to 27 are provided with recesses 33 which are positioned underneath the studs 19 of the keys in the inoperative position of the adjusting bars 24-27.

The setting or adjusting wheels R1-R5 (Figs. 2, 14 and 21) are axially displaceable on the four-cornered shaft 34 and secured against rotation with relation thereto, these shafts being journalled in the side walls 35 and 35a of the frame work of the calculating mechanism. The adjusting wheels R1 to R5 are enclosed by the fork shaped extensions 37 of the bars 24 to 28. Beneath the shafts 34 and at right angle thereto ten rack bars Z₀ to Z₉ (Figs. 2, 7, 15 and 21) are displaceably mounted in slots of the calculating frame. The rack bars Z₀ to Z₉ are engaged with the upwardly forked bolts or bars 38 (Fig. 7) and are secured thereto. These bars or bolts 38 possess a cylindrical section which engages with a groove 39 of the proportional lever 40 which at its bottom part is provided with a cylindrical stud or projection which protrudes into an aperture of a rod or bar 41 disposed underneath the rack bars Z₀ to Z₉ and is rotatable in said aperture. The bar 41 is displaceably mounted

in the holes 36a (Figs. 2 and 7) of the frame of the calculating mechanism, and it is connected by means of a link 42 with the crank disc 44 fixedly secured to the shaft 43. As appears from Figs. 21 and 15 of the drawings the rack bars Z₀ and Z₉ extend towards the left hand side beyond the other rack bars Z₁ to Z₈. The purpose of this arrangement will be more particularly described hereinafter.

Upon the rear section of each four cornered shaft 34 and at the end thereof (Figs. 2 to 7 and 21) a tooth gear wheel 45 is arranged which is adapted to operate the result counting mechanism R by means of suitable parts and in a manner to be described further on. In the journalling beam 46 (Fig. 2) and in the back wall Br of the casing of the result counting mechanism B the shafts 47 of the numbering rollers are rotatably mounted upon which the numbering rollers 48 (Figs. 2 and 18) and the gear wheels 49 and 50 are secured. The arresting spring 52 which is arranged upon the journalling beam B₂ (Fig. 2) by means of the screw 51 is in engagement with the teeth of the gear wheel 50 and secures this wheel in the adjusted position in the well known manner. By means of the pegs 53 or the like the shafts 47 of the numbering rollers will be adjusted whenever required.

At their forward ends the shafts 47 of the numbering rollers carry the driving wheels 54 (Figs. 1 to 7, 18 and 21). Upon the hubs 55 (Figs. 2 and 18) of the driving wheels 54 shoulders or lugs 56 are provided which are adapted to become operatively engaged with the inclined surfaces 57 of the tens' preparing slides 59 which are rockably and displaceably arranged in suitable slots 58 (Fig. 2), this action taking place at the moment of turning the numbering rollers 48 from the number "9" to the number "0".

The preparing slides 59 are provided at their lower sides with notches 60 and 61 (Figs. 2, 18 and 23 to 25) adapted for the engagement of a locking pin 62. This arresting or locking pin 62 is forced continuously against the preparing slide 59 by means of a pressure spring 63 seated in an aperture of the journalling beam 46, by which means the slide 59 may be arrested in any one of the terminal positions defined by the notches 60 and 61. With its inclined surface 64 the preparing slide 59 may act upon the inclined space 65 (Fig. 18) of the tens' slide 66, while a tooth-like shoulder 67 upon the raising of the tens' slide 66 acts upon the teeth of the gear wheel 49 of the numbering roll 48 of the next higher digit.

Upon the shaft 43 (Fig. 21) a locking or arresting disc 43_x is mounted and secured against rotation. It is provided with a groove 43_b engageable with a roller 43_a rotatably mounted on the lever 43_c. This lever is rotatably mounted upon the pivot 211 of the coupling frame 212 to be more particularly described hereinafter. By means of the spring 43_e acting upon the lever 43_c the roller 43_a which is secured to this lever is continuously retained in engagement with the groove or recess 43_b. The extension or lug-like part 43_g provided on the U-shaped portion 43_i of the lever 43_c becomes engaged from below with the arresting bar 68 for the tens' preparing slide 59 of the result counting mechanism R. By the action of the locking bar 68 which in the inoperative position of the machine becomes engaged by means of its projecting teeth 69 with the front faces of the preparing slides 59 these slides are retained in their inoperative position with regard to the tens' slide 66. The locking bar 68

is linked to the parallel levers 68a (of which in Fig. 21 only the right hand lever is shown) which are pivoted at the point 68b. Moreover, the locking bar 68 is guided by the screws 68c (of which only one is shown in Fig. 21) which project through the inclined slots 68d of the locking bar 68. This locking bar will prevent over-turning of the numbering rollers from "9" to "0" and inversely upon the adjustment thereof by the manual operation of the knob or peg 53. This over-turning movement which would produce an unintended preparation of the tens in the setting operation, inasmuch as the preparing slide 59 is prevented by the locking bar 68 from being displaced in the direction of the arrow e, is prevented by the engagement of the lug 56 with the lug 57 of the preparing slide 59. The leaf spring 71 (Fig. 18) which is secured by the screws 46b to the covering bar 46a (Figs. 1 and 2) keeps the tens' slide 66 in the depressed position and towards the right (in Fig. 19 towards the left) by being forced against the edge 72 of the tens' slide 66, so that this tens' slide 66 will normally assume a vertical position. The tens' slide 66 the general configuration of which is shown in Fig. 18 is guided in the grooves 73 and 74 (Fig. 19) which are disposed crosswise of the two rails or bars 75 and 76 provided on the journalling bar in the longitudinal direction thereof. The grooves 73 are of a somewhat greater width than the tens' bar 66 itself, so that this sliding bar 66 on being raised (as seen in Fig. 19) may be rocked towards the right, so that its tooth or projecting lug 67 becomes adapted to engage with the gear wheel 49 (Fig. 18) of the numbering roll 48 of the next higher digit. By means of the lateral projections 77 (Fig. 19) the upward and downward strokes of the tens' slide may be limited. The covering plate 78 (Figs. 2 and 23 to 25) secures the tens' slides 66 against dropping out. The tens' preparing slides 59 are disposed in the slots 58 hereinbefore referred to and are rockable on a shaft 79 which is mounted in the journalling beams 46. These preparing slides 59 are made integral with the returning arm 81 by means of a connecting web 80 (Fig. 18), so that the preparing slides 59 are likewise rockable on the shaft 79. The returning arm 81 which constitutes an extension of the web 80 and extends horizontally towards the left (Fig. 18) cooperates with the upper surface of the upwardly curved extension 82 of the tens' slide 66 of the next higher digit. Below all of the tens' slides 66 a shaft 84 (Figs. 2, 7 and 18) is rotatably mounted upon which a plurality of cams 85 are secured to correspond to the number of the tens' slides 66. The cams are secured upon the shaft 84, so as to be spirally disposed upon the shaft 84, thus causing all tens' slides 66 to be raised once upon each rotation of the shaft 84 which is driven in the manner to be described by the main driving shaft 43, this raising movement commencing with the lowest digit and then going on in succession.

For the cancellation of the values which have been set in the key board T the following mechanism is provided. Upon the cancellation slide 86 (Fig. 20) which is disposed so as to be vertically displaceable on the right hand side of the machine by means of the slot 87 and is moreover vertically displaceable in the guide plate 88 (Fig. 1) a key 3 is provided on its upper extremity which is kept in its position of rest by means of the spring 91 secured thereto at the point 89 and having its other end connected to the

bolt 90, this position of rest being obtained by the fact that the face 92 of the slot 87 bears upon a screw not shown in the drawings. The slide 86 acts by its face 93 upon the arm 94 of the cancelling bar 98 adapted for rocking movement on the shaft 97 at the points 95 and 96. The upper edge 99 of the bar 98 is bent at right angle and with this part it bears against the surface 100 of the extension 101 provided on the locking bar 23. This locking or arresting bar 23 is acted upon by the spring 104 which is secured to the lug 103 of the bar 23 in such a manner that the extension 101 of the bar will bear against the edge 99 of the cancellation bar 98. The rod or bolt 19 which is journaled in the legs 11 of the key operates upon the depression of a key 5, so as to engage the face 105 of the corresponding locking tooth or projection 102 of the locking bar 23 (Fig. 20) and displaces the bar in the direction of the arrow "b" and against the action of the spring 104 connected thereto. As soon as the key 5 has reached its depressed position (Fig. 10) the locking bar 23 is returned to its inoperative position by the action of the spring 104, while the rod or bolt 19 becomes engaged with the groove 106 of the arresting tooth 102 and is retained in this depressed position until either the cancelling key 3 or another key 5 in the row of keys corresponding to the already depressed key 5 is operated.

The addition operating key or feeler 107 (Fig. 15) is provided with a downwardly directed fork shaped extremity and is arranged so as to be vertically displaceable on the machine frame by means of a screw which projects between the legs 108 and 109 of the slide 107, but is not shown in the drawings, and it is also vertically displaceable in the guide plate 88 (Fig. 1). On the upwardly directed extremity of the slide 107 the key 1 is secured by the screws 110. The slide 107 (Fig. 15) by means of the spring 112 secured to the rectangularly bent extension 111 of the leg 109 is retained in its position of rest corresponding to Fig. 1 and which is produced by the engagement of the extension 113 of the slide 107 with the lower side of the guide plate 88. The bolt or stud 114 provided on the rectangular extension 113 of the slide 107 is adapted to act upon the face 115 of the switching lever which is rockably mounted at the point 116. By means of the screw 118 the connecting rod 119 is linked to the switching lever 17. To the downwardly directed extremity of the connecting bar 119 the lever 121, which is fixedly secured to the shaft 120, is linked by the screw 122. Upon the shaft 120 the lever 123 is also fixedly secured the free end of which is engaged in the groove 124 of the collar 126 fixedly disposed upon the rod or bolt 125. This rod 125 is journaled in the two supports 127, 128 so as to be axially displaceable, these two supports being rigidly connected to the frame 36 of the calculating mechanism. The rod or bolt 125 serves for the purpose of switching the proportional rack bar system Z_0 to Z_9 , so that it is set respectively for addition or subtraction, the said bolt 125 being coupled for addition with the rack bar Z_0 , while for subtraction it is coupled to the rack bar Z_9 .

The bolt 129 (Fig. 15) which is provided on the extension 113 of the adding slide 107 acts upon the face 130 of the two-armed lever 132 which is rockably mounted at the point 131. The spring 135 which is operatively secured to the lug 133 of the lever 132 and is connected to a bolt or stud 134, retains the lever 132 in its nor-

mal position in which the face 130 becomes engaged with the bolt or stud 129 of the slide 107. Upon the downwardly directed extremity of the two-armed lever 132 the connecting bar 137 is linked by means of the screw 136. This connecting bar has a rectangularly bent projecting part 138 which by means of the screw 139 is linked to the part 140 of the substantially U-shaped two armed lever 142 which is fixedly arranged upon the shaft 141. At its free upwardly directed extremity the lever 142 (Figs. 15 and 17) is flattened and with its face 143 it is caused to bear from below against the shoulder or lug 144 of a pawl 145 (Figs. 16 and 17) of the coupling 146 which with its stud 147 is journaled in an aperture of the casing 146 of the coupling and on the other hand in an aperture 148 of the cover 149 of the coupling, the first mentioned aperture not being shown on the drawings. To the lug 150 of the pawl 145 a spring 151 is connected the other end of which is secured to a stud 152 provided on the casing 146 of the coupling. The cam disc 153 which is fixedly secured to the shaft 43a has a shoulder 154 which in the open position of the coupling is disengaged from the face 155 of the pawl 145. The coupling 146 is retained in its inoperative position corresponding to the disengagement of the coupling by means of the arresting pawl or lever 157 rockably secured on the bolt 156 and engageable with the notch 158 of the coupling 146 and by the action of the torsional spring 159. By means of the screws 160 (Fig. 17) the cover of the casing 149 is secured to the casing 146 itself at the points 162 and by means of the holes 161 of the cover 149. It should be noted that the cam disc 153 which is keyed to the shaft 43a bears with its face 163 against the wall 164 of the coupling and on the other hand it is movably engaged with the cover 149 of the coupling, so as to prevent the coupling from becoming axially displaced along the shaft 43a. The coupling 146 itself is loosely disposed upon the shaft 43a which at 165 is rotatably journaled in the vicinity of the worm wheel 199. The shaft 43 which is preferably made integral with the cover 149 of the casing is rotatably journaled at 43b (Fig. 17) and in the vicinity of the cam disc 44 (Fig. 7). Upon the shaft 43 the gear wheel 166 is also fixedly secured.

Upon the lever 142 a stud or bolt 167 is secured which acts upon the lever 169 arranged for rocking movement on the shaft 168. This lever 169 by means of a spring 169b secured to the stud 170 of the lever 169 is continuously forced into engagement with the bolt or stud 167 of the lever 142. The lever 169 is secured by means of a web portion 171 to the lever 172 which is rockably disposed upon the shaft 168. The free upwardly directed end of the lever 172 becomes engaged with a groove 173 of a collar 175 loosely disposed upon the shaft 174. Upon the right hand side of the collar 175 a two-armed lever 176 is secured which with its arm 177 bears upon the concentric periphery 179a of the cam surface 179 fixedly secured on the shaft 43a, while the arm 180 of the lever by means of the stud 181 of insulating material keeps the contact spring 183 which is secured to the support 182 depressed, so that the contact pin 184 secured to the contact spring 183 is prevented from touching the contact pin 186 secured to the angular member 185. From the angle pieces 182 and 185 electric conductors lead to the electric motor E which is not particularly shown in the drawings for the sake of clearness.

The lever 132 is loosely disposed at the point 131 (Fig. 15) in such a manner that, besides carrying out a rocking movement in the clockwise direction it also admits of a certain amount of a lateral rocking movement. The connecting rod or link 42 already referred to acts with its portion 187 upon the free end 188 of the lever 132 in a manner more particularly described herein-after.

ter is engaged by a conical wheel 203 (Fig. 7) which is secured to the shaft 84 which extends in parallelism to the rack bars. The shaft 84 upon which the cams 85 (Fig. 18) are secured serves for the feeding and transmission of the tens, as already described.

Upon the left hand end of the tens' feeding shaft 84 a gear wheel 204 (Figs. 2 and 7) is secured, which is engaged by a gear wheel 205, which at its side confronting the machine is provided with a hub 206 (Figs. 3 to 6 and 9) having a shouldered part at its free end upon which a disc 207 (Fig. 8) is riveted or secured in any suitable manner. Between the gear wheel 205 and the disc 207 bolts or studs 208 and a locking member 209 (Figs. 2 to 9) are inserted, so as to constitute thereby a cog-wheel-like member or a pin wheel which is designated broadly by the numerals 205, 207. The bolts 208 and the locking cam 209 are adapted to act upon a two-sectioned sprocket wheel or so called "Maltese-cross" 210 which is fixedly disposed on a stud 211 (Fig. 7) of a frame member 212. This frame is composed of two terminal portions 213 (Figs. 7 and 21) upon which the stud 211 hereinbefore mentioned is provided. The two terminal sections 213 are connected by the intermediate parts 214 between which the coupling wheels 215 are rotatably disposed upon the pivots 216. The frame 212 which is thus formed of the parts 213 to 216 by means of its pivoting studs 211 is rotatably journaled in suitable bearings of the machine frame but not illustrated in the drawings. In the longitudinal direction of the frame 212 (Figs. 2 to 6) a cooperating arresting member 217 is provided which is mainly composed of a rail or web-shaped section 218 carrying teeth 219 which at their free ends are provided with a recess 220 which is concentrically disposed with relation to the rotating shaft 211 of the frame 212. This recess 220 is wedge-shaped, so that it corresponds to the spaces between the teeth of the coupling gear wheel 215 which may be secured thereby against rotation, when they are disengaged from the gear wheels 45 and 54 according to Fig. 6. By this means the coupling gear wheels 215 are caused to be properly engaged by the gear wheels 45 and 54 upon rotation of the frame 212. The arresting member 217 is attached to the wall 35 of the frame of the calculating mechanism (Fig. 2).

The mode of operation of this arrangement is substantially as follows. For the purpose of carrying out an addition, the particular number is set on the key board T (Figs. 1 and 2), so that for instance in this operation upon the depression of the key 5 corresponding to the value "3" the particular stud 19 will displace the adjusting or setting bar 27 into the position shown in dotted lines in Fig. 14, and as a result thereof the adjusting wheel R₂ will become engaged with the rack bar Z₃. The stud 19 will thereby likewise displace the adjusting bar 28 in such a manner that the small wheel R₁ is disengaged from the rack bar Z₀ and assumes the position shown in dotted lines in Fig. 14 of the drawings. By this operation the indicating bar 29 is likewise displaced in such a manner that its indicating or recording segment or sector 31 (Figs. 2 and 10) will uncover the value corresponding to the key depressed in the inspection windows 32. This will also cause the locking bar 23 (Figs. 10 and 20) to be forced backwards by the action of the stud 19 against the corresponding inclined surface 105 in the direction of the arrow b, the corresponding arresting tooth 102 becoming

The subtracting slide 189 (Fig. 15) has a downwardly directed fork shaped portion and is vertically displaceable by means of a screw not shown in the drawings and projecting between the legs 190 and 191 of the slide 189, and it is also vertically displaceable in the guide plate 88 (Fig. 1). By means of the rectangularly bent portion 191 and by the spring 192 secured thereto and to the guide plate 88 the slide 189 is retained in its position of rest in which the part 193 of the slide 189 bears against the guide plate 88. To the upwardly directed extremity of the slide 189 the key 2 is secured by means of the screw 194. A stud or bolt 195 is secured to the extension or shoulder 193 of the slide and acts upon the surface 196 (Figs. 15 and 15a) of the switching lever 117, by which means the bolt or stud 125 is coupled with the rack bar Z₀ by the operation of the members above described 118, 119, 121, 120, 123, 124, 126, so that the rack bars Z₀ to Z₉ operate to produce a negative result. Besides, the bolt or stud 197 secured to the stem 189 of the key acts upon the face 130 and the lever 132 by which means and by the action of the members 137, 139, 140, 142, 143, which have been extensively described above the coupling is closed and the motor contact 184, 186 is actuated by way of the members 142, 167, 169, 171, 172, 173, 175, 180, 181, 183.

The mode of operation of the proportional rack bar system Z₀ to Z₉ hereinbefore mentioned has been more particularly described in United States Patent 1,011,617 in which patent the rack bars 46 and 47 correspond to the rack bars designated respectively Z₀ and Z₉ in this specification. The coupling pin 2 of that patent corresponds to the member 125 of this application and the rack bars 48 of the patent are equivalent to the rack bars Z₁ to Z₈ of this specification.

After having described the several mechanisms belonging to the invention I will now proceed to describe the operation of what constitutes the subject matter proper of the invention more in detail.

In order to be able to effect a transmission of values from the toothed gear wheels 45 (Fig. 21) of the shafts 34 of the switching or feeding mechanism to the gear wheels 54 of the shafts of the numbering rollers the following coupling means are provided. Upon the motor E (Figs. 7 and 15) means are provided for driving the shaft 43a by the operation of the worm gear 198, 199, as soon as the motor contacts 194, 186 are closed. Upon the shaft 43 as already mentioned a crank disc 44 (Fig. 21) is secured which by means of the link 42 is connected to the proportional lever 40 mentioned (Fig. 7), so that upon each rotation of the main driving shaft 43a the rack bars Z₀ to Z₉ are reciprocated once in the longitudinal direction, so that they will cause the rotation of the wheels R₁ to R₅ engaged therewith by the operation of the keys 5.

The gear wheel 166 which is mounted on the shaft 43 is engaged by a gear wheel 201 fixedly secured upon a shaft 200 and to which a bevel gear wheel 202 is connected (Fig. 17). This lat-

then engaged by the action of the spring 104 with the stud 19, so that this stud will become seated in the notch 106 of the tooth, thereby locking the operated key in its depressed position.

- 5 The disengagement of the small gear wheel R1 from the rack bar Z₀ is intended to accomplish the purpose directly to be referred to. It appears from United States Patent 1,011,617 already mentioned that according to the principle of the Mercedes-
 10 Euclid calculating machine the subtraction is effected by the addition of the complementary values of the subtrahend. In order to carry out this operation it is necessary to add "nines", as is well known in those rows of keys in which no values
 15 have been set. For this purpose it is required that the small gear wheel R1 (Figs. 2 and 14) is ordinarily in engagement with the rack bar Z₀, while the other small gear wheels R2 to R5 are disposed
 20 intermediate the rack bars Z₂ and Z₀. Now inasmuch as in the subtracting operation the rack bar Z₀ is moved through nine units and for instance the rack bar Z₃ through six units, and inasmuch as the wheels R1 to R5 of a row of teeth as shown in Fig. 2 are disposed upon the same shaft the feeding
 25 mechanism would be injured, if for instance in one of the rows of teeth the quantity "3" has been set, inasmuch as the small wheel R₁ should then be rotated through nine units and the wheel R₂ through six units which would be impossible however, as both wheels are mounted upon one and the same shaft. The adjusting bar 28 for the numbering value 1 should therefore be constructed in such a manner that by the action of each of the keys of one and the same row of teeth the wheel
 30 R₁ becomes disengaged from the rack bar Z₀, while upon the operation of the key corresponding to the value 1 the small wheel R₁ becomes situated above the rack bar Z₁. This result is accomplished, as illustrated in Fig. 14 by the fact that the inclined surface 28₁ upon which the stud 19 of the key which corresponds to the numbering value 1 is made to act shows a greater inclination than the inclined surfaces 28₂ to 28₉ of equal inclination and upon which the studs 19 of the teeth which
 40 correspond to the values 2—9 are caused to operate. In view of the fact that the undisplaced adjusting bars 24 to 26 have not been moved the stud 19 of the depressed key has been free to enter into the notches 33 of the bars 24 to 26 situated below the stud 19 and in the same vertical plane, so that now the adjusted bars as well as the non-adjusted bars are now arrested with relation to each other and the complete depression of any additional key of this row is impossible as long as
 45 the operated key is retained in its depressed position, inasmuch as the studs 19 will impinge either upon the edge *x* of the particular adjusting bar that has been displaced (which in this case is the adjusting bar 27) or upon the edge *y* of the adjusting bar which has been locked by the stud 19 of the depressed key (which in this case will be the adjusting bars 24 to 26).

- After the term to be added has been set on the key board T the adding key 1 (Figs. 1 and 15) is operated and in consequence thereof mechanisms are operated as follows. Upon the depression of the adding key 1 against the action of the spring 112 the stud or bolt 114 secured to the shoulder 113 acts upon the face 115 of the switching lever 117 rocking it on the point 116 and in the anti-clockwise direction. The stud 114 moves down the face 115 of the switching lever 117 upon the depression of the adding key 1 and is engaged with the notch 117a of the
 50 switching lever 117. Inasmuch as the face 196

of the lever 117 will then become engaged from below with the stud or bolt 195 secured to the shoulder or extension 193 of the subtracting lever 189 it is not possible to depress the subtracting key 2 as long as the adding key 1 is retained in its operative position. By the rocking of the switching lever 117 in the anticlockwise direction the shaft 120 is rocked clockwise by means of the members 119 and 121. The lever 123 which is likewise fixedly secured to the shaft 120 and the free end of which is engaged with the groove 124 of the collar 126 fixedly mounted upon the shaft or bolt 125 will then displace this shaft in the direction of the arrow "g" and cause the shaft 125 to be coupled to the rack bar Z₀, so that the well known proportional rack bar system is coupled to the machine and is ready for adding operations.

Upon the depression of the adding key 1 (Fig. 15) the bolt 129 secured to the extension or shoulder 113 of the slide 107 acts upon the edge 130 of the two-armed lever 132 rocking the same clockwise and contrary to the action of the spring 135 which is connected to the lug portion 133. The lever 132 in its rocking movement carries the connecting rod 137 which is linked thereto, with it in the direction of the arrow "h". This connecting rod 137 causes the rocking of the lever 142 in the direction of the arrow "i" which is linked to the rod 137 and is fixedly secured on the shaft 141. In this movement the bolt or stud 167 of the lever 142 acts upon the lever 169 rocking the same anticlockwise and contrary to the action of the spring 169b which is connected to the bolt 170. Inasmuch as the lever 172 is connected by the intermediate web portion to the lever 169 the lever 172 will participate in the rocking movement of the lever 169. The lever 172 which with its free end is engaged in the groove 173 of the sleeve 175 which is loosely arranged upon the shaft 174 causes the sleeve to be displaced in the direction of the arrow "j", and the arm 177 of the lever 176 which is fixed to the sleeve 175 is caused to slip off the concentric surface of the cam 179 fixedly secured to the shaft 43a. The arm 177 moves down upon the collar 179b, so that the lever 176 is rocked anticlockwise. Inasmuch as the spring 183 is thereby forced to follow the movement of the lever 176 the two contact pins 184 and 186 are caused to engage and the circuit is thereby closed.

After the closing of the contacts switching in the motor circuits the shaft 43a is rotated in the direction of the arrow "k" shown in Fig. 7, which causes the cam 153 secured to the same shaft 43a to be rotated in the same direction.

By the rocking of the lever 142 in the direction of the arrow "i" (Fig. 15) the surface 143 of the lever 142 becomes disengaged from the lug 144 of the pawl 145 and the coupling member 146, so that the lug or projection 150 of the pawl 145 is made to engage with the cam 153 secured to the shaft 43a after the closing of the motor contacts 184, 186. In pursuance thereof the coupling 146 follows the rotation of the shaft 43a, so that the shaft 43 with the gear wheel 166 and the crank disc 44 are rotated in the direction of the arrow "k" by means of the coupling member 149 which is fixedly secured to the shaft 43. As a result thereof the proportional rack bar system is operated by the action of the connecting bar 42 and the proportional lever 40, this lever 40 (Figs. 15 and 21) in view of the rack bar Z₀ being arrested by the shaft 125 being accordingly rocked on the stud 38 of the rack bar Z₀. This causes the rack

bar Z_1 to be reciprocated for a distance of one unit, and the rack bar Z_2 through three units and so on.

Upon the rotation of the gear wheel 166 in the direction of the arrow "k" the gear wheel 201 and the conical wheel 202 are rotated in the direction of the arrow "l" which in its turn rotates the conical gear wheel 203 and accordingly the tens' feeding shaft 84 (Figs. 7 and 18) in the direction of the arrow "m". Now, assuming that, as above stated, the key corresponding to the value 3 has been depressed the corresponding small adjusting wheel R_2 (Fig. 14) is in engagement with the rack bar Z_3 , while the small adjusting wheel R_1 will assume the position between the rack bars Z_0 and Z_1 . Now, inasmuch as the rack bar Z_3 has been reciprocated for a distance of three units the adjusting wheel R_2 which is engaged with this rack bar and the corresponding four-cornered shaft 34 are rotated to and fro. It now becomes necessary to transmit the advancing movement of the rack bars to the numbering rollers 48. This is effected according to the invention in the following manner.

If the main driving shaft 43 assumes the operative position according to Fig. 7 the driving and coupling members 204 to 209 will also be placed in the position shown in Figs. 7 and 3 of the drawings. In this position the coupling wheels 215 are in engagement with the gear wheels 45 of the shafts 34 of the feeding mechanism while they are disengaged from the gear wheel 54 of the shafts 47 of the counting mechanism, the so called "Maltese-cross" 210 assuming the position shown in Fig. 3 with relation to the driving studs 208. Upon now closing the coupling key 1 in the manner described the main driving shaft 43 is rotated and the tens' feeding shaft 84 is thereby rotated in the direction of the arrow "m" in Fig. 7.

In the beginning of the rotating movement of the driving shaft 43 the wheels 45 do not yet participate in this movement in view of the fact that in the Mercedes-Euclid calculating machine the operation of the crank disc and of the connecting link 42, 44 of the proportional lever 40 commences in the dead-center position (Figs. 7 and 21) so that at the start the rack bars Z_0 to Z_9 and the wheels 45 do not perform any appreciable movement. During this position of rest of the wheels 45 the gear wheel 204 which is mounted on the tens' feeding shaft 84 rotates the gear wheel 205 in the direction of the arrow "n" sufficiently to cause the so called "Maltese-cross" 210 to be rotated in the direction of the arrow "o" by means of the studs 208 from its position of Fig. 3. Inasmuch as this wheel member 210 is secured to the shaft or stud 211 of the frame 212 carrying the coupling gear wheels 215, it is obvious that the entire frame 212 will participate in this rotating movement. As soon as the arresting cam member 209 of the pin wheel 205, 207 and the locking cam surface 210a of the "Maltese-cross" member 210 have been moved to the position shown in Fig. 4, the coupling wheels 215 are in engagement with the wheels 54 of the counting mechanism, so that now the operative connection is obtained between the gear wheels 45 and the gear wheels 54 in accordance with Fig. 4 of the drawings. After this driving connection has been produced, the rack bars Z_1 to Z_9 commence their movement and rotate all of the adjusting wheels R_1 to R_9 that have been adjusted above the rack bars, and consequently the shafts 34 and gear wheels 45

are also rotated to correspond to the adjusted values. These rotating movements are now transmitted by the coupling gear wheels 215 to the gear wheels 54 and in pursuance thereof to the shafts 47 of the numbering rollers, by which means the said rollers 48 will indicate the amount set by the keys or, provided a certain amount has already been recorded, they will indicate the sum of the amounts set by the keys.

This transferring of values is effected during the forward movement of the rack bars Z_1 to Z_9 while the pin wheel 205/207 has continued to be rotated in the direction of the arrow "n" from the position indicated in Fig. 4 of the drawings into the position corresponding to Fig. 5. During this rotation there has not been any rotation of the "Maltese-cross" 210, inasmuch as this has been prevented by the operation of the arresting members 209 and 210a, it being necessary to prevent rotation of the "Maltese-cross" in order to insure the engagement of the coupling wheels 215 with the gear wheel 45 and 54 during the transmission of value. After the rack bars Z_1 and Z_9 have completed their forward movement and after the transferring of the values has been completed, the driving members 42, 44 for the operation of the crank disc (Fig. 15) are approaching their second dead-center position, so that the rack bars Z_1 to Z_9 are substantially arrested for all practical purposes. The pin wheel 205, 207 will now assume the position shown in Fig. 5 with relation to the "Maltese-cross" 210. Now, while the driving members 42, 44 for the crank disc are moved away from this second dead-center position upon continuing the rotation of the main driving shaft 43, the rack bars Z_1 to Z_9 have not yet commenced their movement. During this position of rest the pin wheel 205, 207 continues its rotation in the direction of the arrow "n". This causes the stud 208a of the wheel (Fig. 5) to act upon the "Maltese-cross" 210 which is thereby caused to continue its rotation in the direction of the arrow "o", so that the coupling gear wheels 215 are disengaged from the gear wheels 45 and 54. As soon as the coupling gear wheels 215 have been disengaged from the wheels 45 and 54, the rack bars Z_1 to Z_9 are moved back to their position of rest and the coupling wheels 215 upon the continued rotation of the "Maltese-cross" 210 in the direction of the arrow "o" are engaged with the locking teeth 217 of the arresting member 218 (Fig. 6) by which means unintentional rotation of the coupling wheels 215 is avoided.

During this movement of the crank drive 42, 44 into the second dead-center position (that is to say opposite the dead-center position corresponding to Fig. 15) the edge 187 of the connecting bar 42 acts upon the extremity 188 of the lever 132, moving it in the direction of the arrow "p" by which means its edge 130 is moved out of the reach of the pin 129 secured to the stem of the adding key 1. This causes the lever 132 to be rocked anticlockwise in view of the action of its spring 135 and as a result thereof the flat side of the lever rests against the front side of the pin or stud 129. In consequence of this rocking movement of the lever 132 the bar 137 has been moved contrary to the direction of the arrow "h", which causes the lever 142 to be likewise moved contrary to the direction of the arrow "i", so that its edge 143 is moved into the path of the lug 144 of the coupling pawl 145 (Fig. 16). Hence after a complete rotation of the driving shaft 43 the coupling 145, 153 will be disengaged and the shaft

43 will be arrested, though the adding key is kept depressed.

By the rocking movement of the lever 142 contrary to the direction of the arrow "i" the pin 167 of this lever has also released the yoke-like or staple-like member 169, 171, 172, so that this member may be acted upon by the spring 169b. As soon as the portion 179c of the cam 179 situated in the same plane with the periphery of the sleeve 179 has been moved into the path of the arm 177 of the contact lever 176, this lever is displaced by the action of the spring 169b in the direction contrary to that of the arrow "j", and the contact lever upon the further rotation of the shaft 43a is rocked by the cam 179 in the clockwise direction. This causes the contacts 184, 186 to be disengaged and the motor to be stopped, while the contact lever 176, as soon as it is disengaged from the cam 179 is pushed onto the concentric periphery 179a by the action of the spring 169b. Upon the release of the adding key 1 the edge 130 of the lever 132 is again forced below the stud 129 of the stem of the adding key by the action of the spring 135.

After the coupling 164 has been opened by the lever 142 in the manner just described, the main driving shaft 43 is again arrested and the driving means for the crank disc will then also have assumed the dead-center and inoperative position according to Fig. 7. In consequence thereof the pin wheel 205, 207 and the so-called "Maltese-cross" 210 are likewise in the position of rest according to Fig. 3 of the drawings. The pin wheel 205, 207 will therefore also perform one rotation with each rotation of the main driving shaft 43, while the "Maltese-cross" 210 and the frame 212 for the coupling wheels riveted thereto will be turned through half a revolution only.

In the position of rest of the frame 211 to 216 for the coupling wheels the shafts 47 of the numbering wheels may be suitably adjusted by the operation of the buttons 53, inasmuch as the coupling gear wheels 215 are disengaged from the wheels 54 which are disposed in the casing B for the result counting mechanism. Any unintentional rotation of the coupling gear wheels 215 is avoided by the engagement thereof with the gear wheels 45 of the shafts 34 of the feeding mechanism.

After the numbering roller 48 of the shaft 47 farthest to the right has been rotated in the direction of the arrow "q" (Fig. 18) to a sufficient extent so as to cause the wheel to switch from figure "9" to figure "0", the lug portion 56 of the driving wheel 54 acts upon the inclined surface 57 of the preparing slide 59 and causes this slide to be displaced in the direction of the arrow "e", which movement may be effected because, when starting the rotation of the main driving shaft 43 the locking disc 43x (Fig. 21) fixedly secured thereto acts upon the arresting roller 43d which is fixedly secured to the lever 43c, this roller 43d becoming thereby disengaged from the recess 43b of the locking disc 43x and causing the lever 43c to be rocked anticlockwise and against the action of the spring 43e. This will also cause the extension or lug 43g of the U-shaped portion 43f to become engaged from below with the locking bar 68 of the tens' preparing slides 59, so that the bar 68 (Figs. 2 and 21) with its teeth 69 will release the preparing slides 59. Hence, the particular slides 59 may be moved in the direction of the arrow "e" (Fig. 22), thereby causing the back-setting member 80, 81 (Fig. 18) to be rocked anticlockwise on the shaft 79.

In pursuance thereof the locking pin 62 (Fig. 2) leaves the groove 60 and becomes engaged with the groove 61, so that the preparing slide 59 is retained in its new position. As a result of this procedure the inclined edge 64 of the preparing slide 59 has been moved into the path of movement of the inclined edge 65 of the tens' slide. At the termination of each actuation of the crank the cams 85 are serially operated from right to left. The cam disc 85 to the right shown in Fig. 18 will thereby act upon the extension or shoulder 82 of the tens' slide 66, the slide 66 being raised thereby and its inclined edge 65 becoming engaged with the edge 64 of the preparing slide 59. The slide is thereby moved towards the left (as seen in Fig. 18) and is thereby caused to become engaged by its shoulder 67 with the gear wheel 49 of the next higher numbering roll 48, so that this roll is rotated for the value of one unit. After the gear wheel 49 has been fed for one unit, the cam 85 shown at the left of Fig. 18 is operated and raises the corresponding tens' slide 66. This will cause the extension 82 of the slide to act upon the leg 81 of the staple-like member 80, so that this member is rocked on its shaft 79, and at the same time the preparing slide 59 is acted upon contrary to the direction of the arrow "e", so that this preparing slide is returned into its inoperative position. If now, as occurs at the end of each operation of the crank, the tens' slide 66 is again moved upwards in the manner described, its shoulder or extension 67 will not act upon the gear wheel 49, inasmuch as the edge 64 of the preparing slide 59 has been moved away from the path of operation of the inclined surface 65 of the tens' slide 66. Thus the numbering roll 48 is not operated as long as there is no further transferring of tens. As soon as the tens' slide 66 has been released by the action of the inclined surface 64 of the preparing slide 59, it is returned by its corresponding spring 71 into its position of rest, while the numbering rolls 48 are secured in their particular position in the well known manner by the engagement of the locking springs 52 (Fig. 2) with the gear wheels 50.

The depressed value keys are released after the transferring of the adjusted quantity into the result counting mechanism by the depression of the cancellation key 3 (Fig. 20) inasmuch as these cancellation keys 3 by their depression cause the yoke-shaped member 94, 98, 99 to be rocked in the clockwise direction by which means all the key locking bars 23 are moved contrary to the action of their springs 104 in the direction of the arrow "b". In consequence thereof the studs 19 of the depressed keys are released so that such keys will be thrown upwards by the action of their springs 14 (Fig. 10).

The mode of procedure in the subtracting operation is distinguished from the adding operation only by the fact that upon the depression of the subtracting key 1 (Fig. 15) the stud or bolt 195 acts upon the surface 196 of the switching lever 117, causing said lever to be rocked clockwise on its fulcrum 116. In consequence thereof the face 115 of this lever becomes seated underneath the stud or bolt 114 of the adding slide 107 and thereby prevents the depression of the adding key 1, as long as the subtracting key 2 is in the depressed position. Moreover, the switching lever 117 causes an anticlockwise rocking movement of the lever 121 connected thereto by the connecting link 119 and of the shaft 120 upon which the lever 121 is fixedly secured. Upon

said shaft 120 a lever 123 is also fixedly disposed, the free end of which becomes engaged with the groove 124 of the collar 126 secured to the shaft or bolt 125. This shaft 125 is thereby displaced
 5 contrary to the direction of the arrow "g" and is coupled to the rack bar Z₆, so that the proportional rack bar system is adjusted for the subtracting operation.

While in the embodiment described and in the
 10 modification corresponding to Figs. 1 to 21 the frame carrying the coupling gear wheels 215 for the coupling and uncoupling thereof is always turned in the same direction another exemplification is shown in Figs. 22 to 25 in which the
 15 frame for the coupling of the coupling gear wheels and for the uncoupling thereof is turned in opposite directions. In the description of this exemplification those parts which agree with the parts of the exemplification first described are
 20 designated by the same reference characters with the addition of an index x. In this modified construction a gear wheel 204^x (Figs. 23 to 25) is fixed to the tens' feeding shaft; by way of a gear wheel 222 it drives a gear wheel 224 which is
 25 rotatably disposed upon a shaft 223 (these parts not being shown in Fig. 22 for the sake of clearness) and to which a cam member 225 is rigidly secured. This cam 225 cooperates with a roller 226 which is rotatably mounted on a descending
 30 arm of an angular lever 227 which is secured to the left hand stud 211^x of the frame 212^x, which carries the coupling gear wheels 215^x. Upon the other arm of the angular lever 227, a tensional spring 228 is made to act, which causes the roller
 35 226 to be continuously kept in engagement with the cam 225.

The mode of operation of the exemplification described is substantially as follows. In the position of rest the parts occupy the relative position shown in Fig. 22 in which the coupling gear wheels 215^x are in engagement with the gear wheels 45^x of the shafts 34^x of the feeding mechanism and are disengaged from the gear wheels 54^x of the shafts 47^x of the numbering rollers.
 45 Now, if the gear wheel 204^x is rotated in the direction of the arrow "m", the gear wheel 224 and the cam 225 connected therewith will be rotated in the direction of the arrow "n" (Fig. 22). In the beginning of this rotary movement the
 50 roller 226 by the action of the spring 228 will move along the lower portion of the cam member 225, by which means the angular lever 227 and in consequence thereof the frame 212^x carrying the coupling gear wheels 215^x are rocked clockwise, so that the coupling gear wheels 215^x are also engaged by the gear wheels 54^x. This position of engagement is illustrated in Fig. 23. It is maintained as long as the roller 226 is moved
 55 along the lower concentric part of the cam 225, that is to say until the transferring of values has been completed. After this transfer the roller 226 is moved from the lower concentric portion of the cam 225 onto the higher concentric por-

tion thereof, by which means the angular lever 227 is rocked anticlockwise, so that the coupling gear wheels 215^x are disengaged from the gear wheels 54^x. This position is shown in Fig. 24
 80 of the drawings at the moment of disengaging action. During the succeeding movement of the roller 226 along the higher concentric portion of the cam 225 the rack bars Z₁ to Z₆ are returned into their initial or inoperative position. A special locking frame for the coupling gear wheels 215^x is not necessary in this arrangement in view
 85 of the fact that the coupling gear wheels 215^x are permanently engaged by the gear wheels 45^x.

In Fig. 25 substantially the same arrangement of parts is shown as in Figs. 22 to 24 with the difference however that the cam 225 is replaced
 90 by a full circular disc in which a cam groove 225^a has been cut adapted for the guiding of the roller 226 of the angular lever 227. This arrangement presents the advantage over the exemplification according to Figs. 22 to 24 that, in view of the positive guiding of the roller 226, the occurrence of centrifugal forces is avoided which are liable to interfere with the reliability of the coupling and uncoupling operations. The spring
 95 228 may obviously be dispensed with in this modification. The construction of the rockable frame may be of any suitable kind, the frame may be replaced by a smooth shaft in which recesses or slots are cut or provided by a milling
 100 operation for the reception of the coupling gear wheels 215 and 215^x.

It should be understood that the invention is not confined to the particular embodiments herein shown and described merely by way of exemplification and illustration of its principles,
 110 but it is susceptible of modifications and changes within the scope of the appended claims.

I claim:—

1. A coupling member for the counting gears 115 and value transferring wheels of a calculating machine comprising a rotatably mounted member having coupling elements rotatable thereon, and means for rotating the rotatably mounted member to move the coupling elements into en-
 120 gagement with the gears and wheels.
2. A device as claimed in claim 1 wherein the rotatably mounted member is disposed vertically to the plane of the axes of the gears and wheels.
3. A device as claimed in claim 1 wherein the
 125 coupling elements consist of toothed wheels, the rotating axes thereof being disposed vertically to the axes of the rotatably mounted member.
4. A device as claimed in claim 1 wherein a Maltese cross gear is connected with the rotat-
 130 ably mounted member and a wheel is provided having pins thereon for driving the Maltese cross gear.
5. A device as claimed in claim 1 wherein means is provided for positively rotating the ro-
 135 tatably mounted member in one direction only.

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