March 25, 1952 R. V. REPPERT 2,590,345

DIFFERENTIAL ACTUATING MECHANISM

Filed Oct. 31, 1950

2 SHEETS—SHEET 1

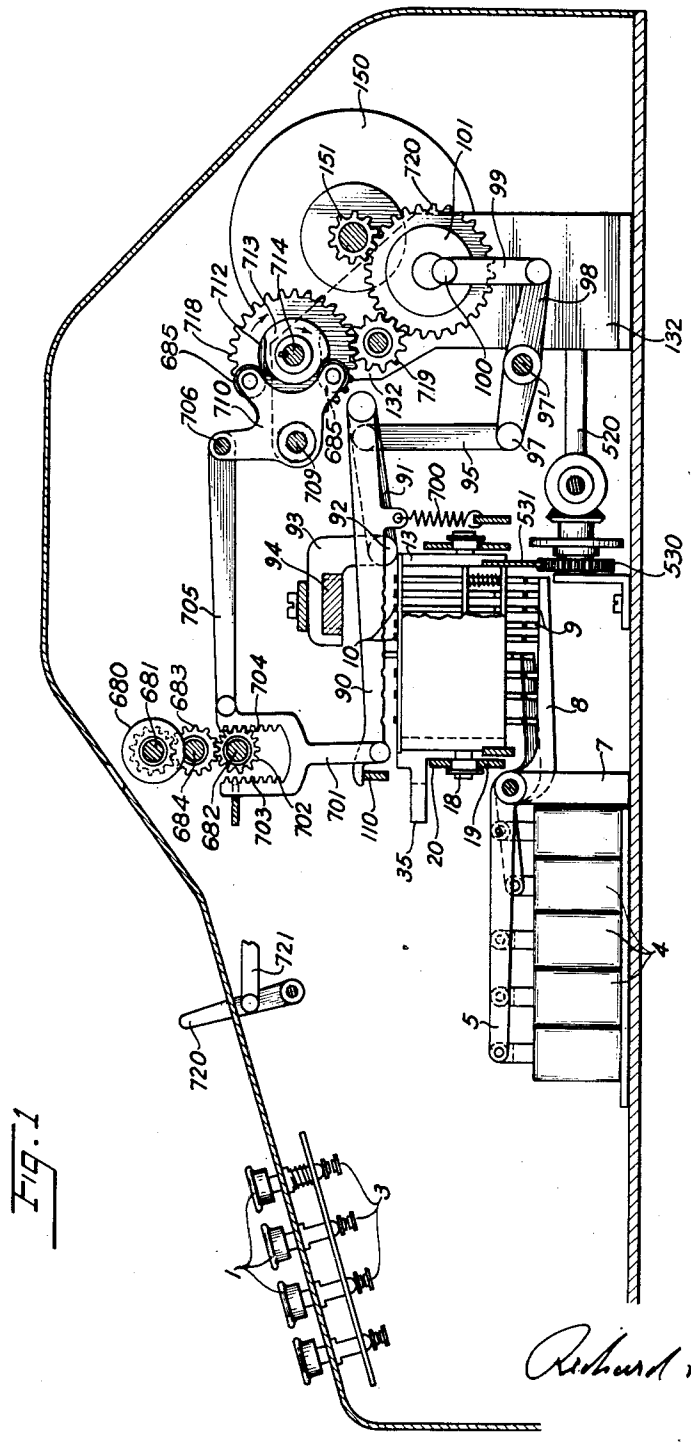


Fig. 1

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2 SHEETS—SHEET 2

Fig. 2

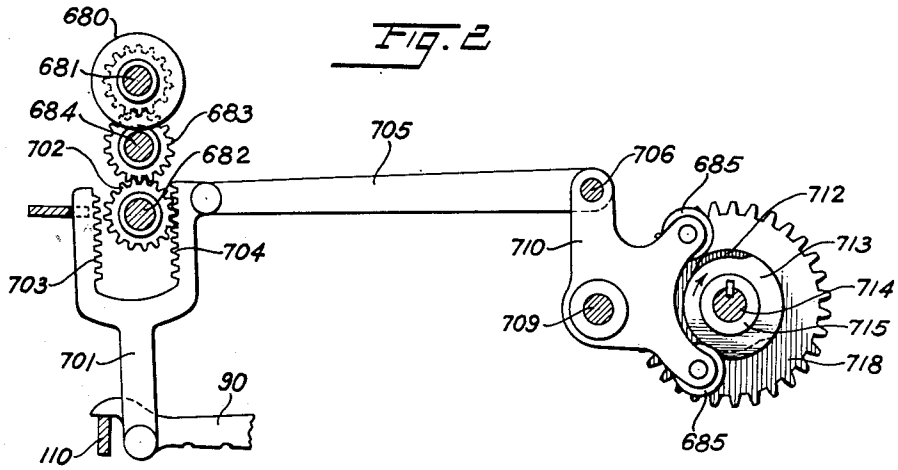


Fig. 3

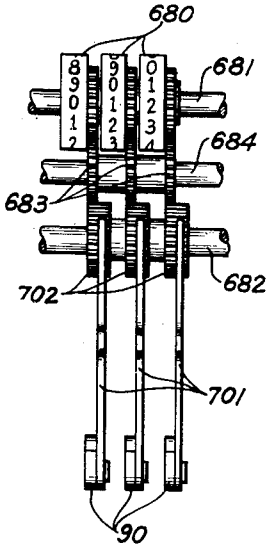
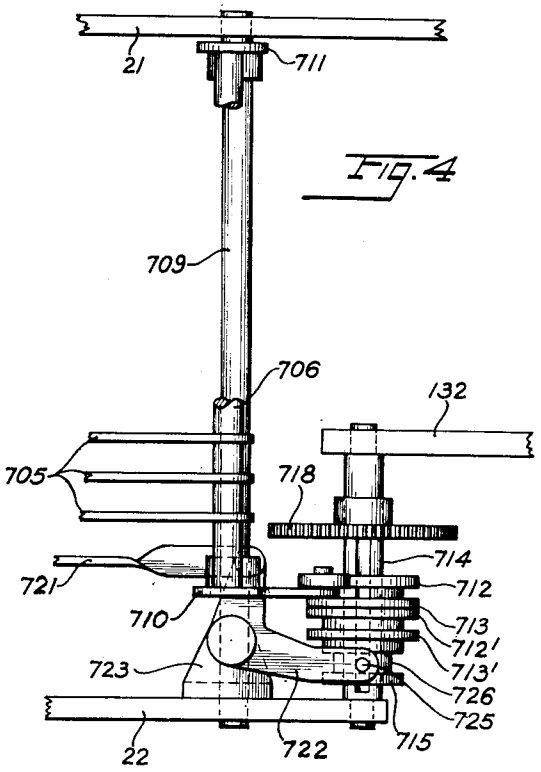


Fig. 4



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UNITED STATES PATENT OFFICE

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DIFFERENTIAL ACTUATING MECHANISM

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Application October 31, 1950, Serial No. 193,146

2 Claims. (Cl. 235—79)

1

This invention relates to improvements in calculating machines and more particularly to register actuating devices therefore.

The general object is, to provide register actuating devices of simple and novel construction, selectable for operation by ten digit keys and adapted to receive reciprocatory movement of uniform extent and of harmonic nature from a power source and to impart rotary movement of harmonic nature and of varying extent to the register wheels during both strokes of a reciprocatory movement; furthermore, such movement may be selectively imparted to the register wheels in either adding or subtracting direction of rotation.

This invention is disclosed as embodied in a form of calculating machine as illustrated in the copending application Serial No. 175,990 to which reference is to be made for a complete disclosure of features of this type of machine, which are not disclosed herein. For this reason it is deemed unnecessary to describe in detail the devices operated to introduce an item to be added or multiplied by the operation of the digit keys and the operation of the devices set in motion by the operation of the multiplying key.

General description

The devices for setting up or introducing a multiplicand item are identical with those disclosed in the said copending application and comprises a ten key keyboard of digit keys operable to select and set up fulcrum pins in the various rows of a pin carriage; the carriage being moved step by step between key operations.

In the present invention actuating the levers for the register wheels are actuated to have oscillatory movement, whereby one oscillation represents one operating or adding cycle and to impart movement to the register wheels during both strokes of an oscillatory movement. The extent of oscillatory movement of the levers is according to the digit value of the keys operated to select points of oscillation for the levers and furthermore, one half of a digit value movement is imparted to the register wheels during the initial stroke of the oscillatory movement and the second half during the return stroke.

This design provides the advantage of a short oscillatory movement of the mass in motion, represented by the actuating levers and associated parts and as the movement is of harmonic nature, that is, with gradual acceleration and gradual deceleration, they can be oscillated with great speed and without shock, noise and wear.

The register is of the well known crawl type, as is shown in the U. S. Patent No. 1,838,180 issued to Clyde Gardner on October 20, 1931, to which patent reference is made for a detail description thereof.

Reference is now made to the accompanying

2

drawings wherein like reference characters designate like parts and wherein:

Fig. 1 is a vertical section through a calculating machine and showing in side elevation one embodiment of the register actuating device as used in conjunction therewith;

Fig. 2 is a detail side elevation of the register actuating device;

Fig. 3 is a detail front elevation of the gear train actuated by the register actuating device and showing the arrangement for rotating the register wheels; and

Fig. 4 is a plan view of the register actuating device and showing the arrangement for shifting the actuating cams.

A series of register numeral wheels **680** are mounted on a shaft **681** and are geared to a series of register gears **702** on shaft **682** by means of intermediate gears **683** on shaft **684**. The gears **702** are subject to rotation in either direction by means of two series of racks **703** and **704**, which straddle the gears, so that one series of racks is in mesh with the gears and the other series of racks just clears the teeth of the gears. The racks **703** and **704** are joined to form single members **701** and these members are pivotally mounted to a series of actuating levers **90** which, in turn, connect to levers **91**, pivoted to individual support plates **93** at **92**. These plates are clamped onto the transverse member **94** fastened to the frame work of the machine. Springs **700** connected to the actuating levers **90**, tend to hold the levers in normal position, with the front ends thereof resting on the transverse member **110**. Individual links **95** connect the levers **91** to a rod **97** of a bail frame, formed by the shaft **97'** mounted in the frame plates **21** and **22**, and the two end levers **98**. One end lever **98**, connects by a link **99** to the eccentrically mounted pivot **100** on the disc **101**, which is subject to rotation by power means under control of the devices operated for adding or multiplying operation, as is fully described in my above-mentioned copending application.

A key board of ten digit keys **1** is provided for introducing an item to be added and upon operation sets pins **10**, mounted in the various rows of a pin carriage **13**, into operative position and simultaneously moves the carriage to bring the pins so set, into operative relation with the actuating levers **90**. The pins serve as fulcrum points for the actuating levers **90** and upon operation of the levers by their power means, the levers rock on the pins set in position by the keys and this oscillatory movement imparts reciprocatory movement to the racks **703** and **704**. Each stroke of a reciprocatory movement of a rack is in proportion to the one half digit value of the key operated to set the respective fulcrum pin. According to the direction it is desired to rotate a gear **702**, either a rack **703** or a rack **704** engages the

respective 702 during the initial or up stroke of a reciprocatory movement of the rack and the opposite rack engages the gear during the return stroke, thereby imparting rotation of a full digit value to the gear during a complete reciprocation of the respective rack member 701.

For the purpose of engaging and disengaging the racks with the gears, links 705 connect the racks 704 with a bail frame rod 706, carried in the side levers 710, mounted on the shaft 709. One side lever serves as a cam follower and has two rollers 685 in cooperative relation with a set of two cams 712 and 713, mounted on a sleeve 715. There is another set of two cams 712' and 713' mounted on the sleeve, which is slidably keyed to the shaft 714, and means are provided to slide the sleeve to thereby position either set of cams into operative relation with the cam follower. The shaft 714 is rotatably mounted in the brackets 22 and 132 and a gear 718 fastened thereto is geared to a gear 720 by means of an intermediate pinion 719 mounted on the bracket 132. The gear 720 is mounted on the power rotated sleeve which carries the above mentioned disc 101, which operates the actuating levers 90 for the register wheels, as described in detail in my above mentioned copending application.

As shown in Fig. 2, the rotation of the cams 712 and 713, will immediately move the 703 series of racks into engagement with the gears 702 and after 180 degrees of rotation will disengage the racks 704 and engage the racks 703. The rotation of the cams is synchronised with the reciprocation of the racks, so that the gears 702 will be rotated clockwise during both strokes of the reciprocatory movement of the racks, as seen in Fig. 2.

To change the direction of rotation of the register gears, the second set of cams (712' and 713') is positioned in operative relation with the cam follower 710, by means described hereinafter and these cams are timed to actuate the follower after 180 degrees of rotation to disengage the 704 series of racks and to engage the 703 series of racks. In view of the synchronised reciprocation of the racks, the gears 702 will be rotated anti-clockwise during a reciprocatory movement of the racks, as seen in Fig. 2.

A manually operable lever 720 is conveniently located on the key board and is operable to shift the sleeve 715 to position either set of cams into operative relation with the follower 710. A link 721 extends from the lever 720 to a bell crank 722 horizontally mounted on a bracket 723 fastened to the side plate 22 and an arm of the lever carries a pin 725 which extends into a groove 726 in the cam sleeve 715.

By these means, the operation of the lever 720 will shift the sleeve 715 and position either set of cams in position to actuate the follower and thereby select the direction of rotation of the register gears.

Having now particularly described my invention, what I desire to secure by Letters Patent of the United States and what I claim is:

1. In a calculating machine having a register, the combination of register gears, two series of racks for rotating the register gears and engageable and disengageable therewith, actuating levers operatively connected to the racks and oscillatable about selectable points of oscillation to thereby vary the reciprocatory movement imparted to the racks by the levers, keys representing the digits, a carriage movable step by step by the operation of the keys, a series of rows of pins representing the digits in the carriage, settable to serve as points of oscillation for the actuating levers, said carriage being movable to bring the rows of pins in succession into operative relation with their setting means, means under control of the keys to set pins in said carriage in accordance with the digit value of the keys operated, means to engage one series of racks with the register gears during the initial stroke of a reciprocatory movement of the racks and to engage the other series of racks with the register gears, during the return stroke of a reciprocatory movement of the racks, to thereby impart rotation to the register gears in accordance with the digit value of the keys operated during a complete reciprocatory movement of the racks and means to impart oscillatory movement to the actuating levers about the selected points of oscillation.

2. In a calculating machine having a register, the combination of register gears, two series of racks for rotating the register gears, engageable and disengageable therewith, actuating levers operatively connected to the racks and oscillatable about selectable points of oscillation to thereby vary the reciprocatory movement imparted to the racks by the levers, keys representing the digits, means under control of the keys to select the points of oscillation for the actuating levers to thereby determine the extent of reciprocatory movement imparted to the racks by the actuating levers in accordance with one half of the digit value of the keys operated, means to engage one series of racks with the register gears during the initial stroke of a reciprocatory movement of the racks and to engage the other series of racks with the register gears during the return stroke of a reciprocatory movement of the racks, to thereby impart rotation to the register gears in accordance with the digit value of the keys operated during a complete reciprocatory movement of the racks, means to impart oscillatory movement to the actuating levers about the selected points of oscillation, and manually settable means to select either series of racks for engagement with the register gears during the initial stroke of a reciprocatory movement of the racks and the other series of racks for engagement with the gears during the return stroke of a reciprocatory movement of the racks, to thereby be enabled to rotate the register gears in either direction or for adding or substracting movement as desired.

RICHARD V. REPPERT.

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