

Oct. 28, 1941.

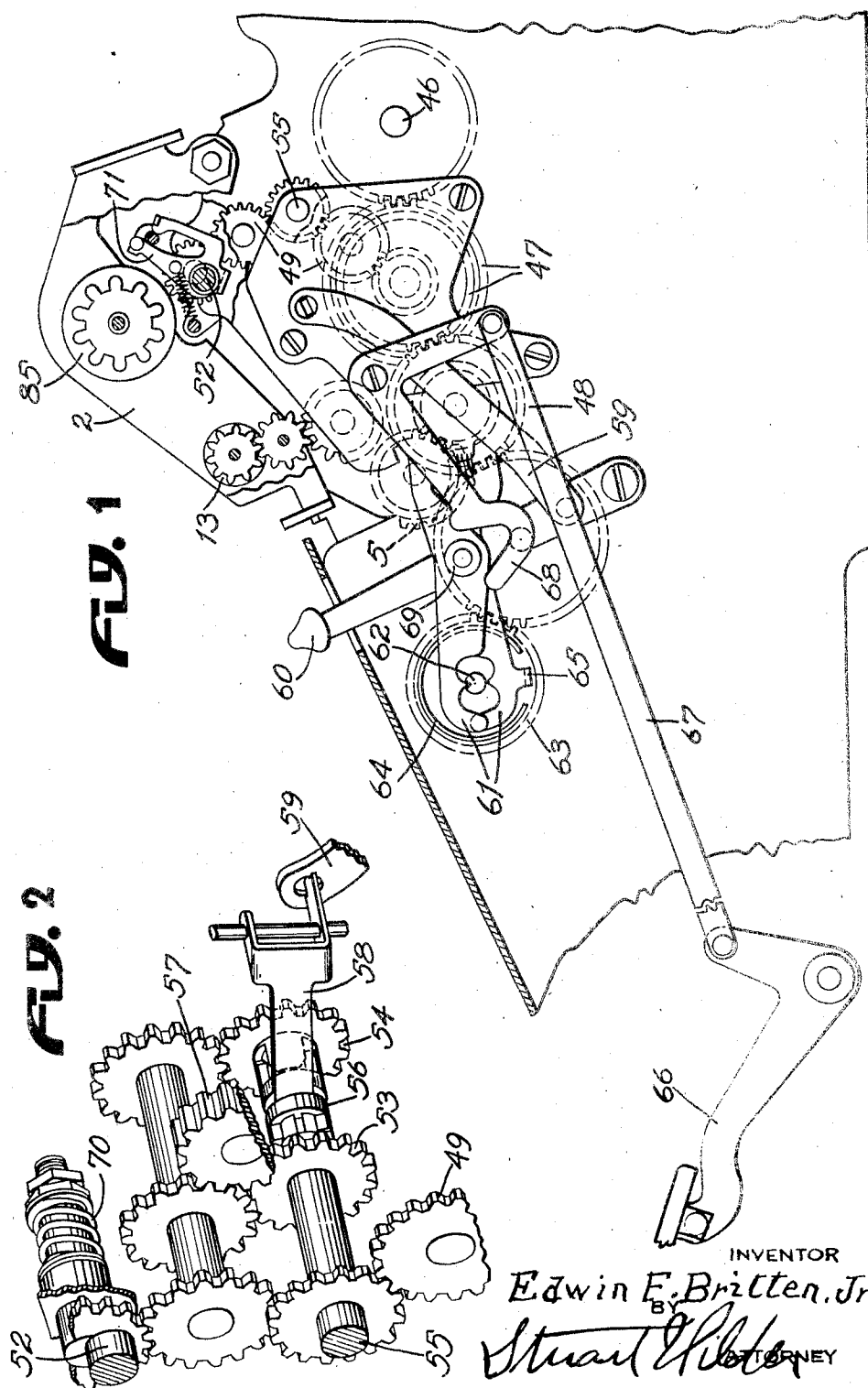
E. F. BRITTEN, JR.

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CALCULATING MACHINE

Filed June 14, 1940

2 Sheets-Sheet 1



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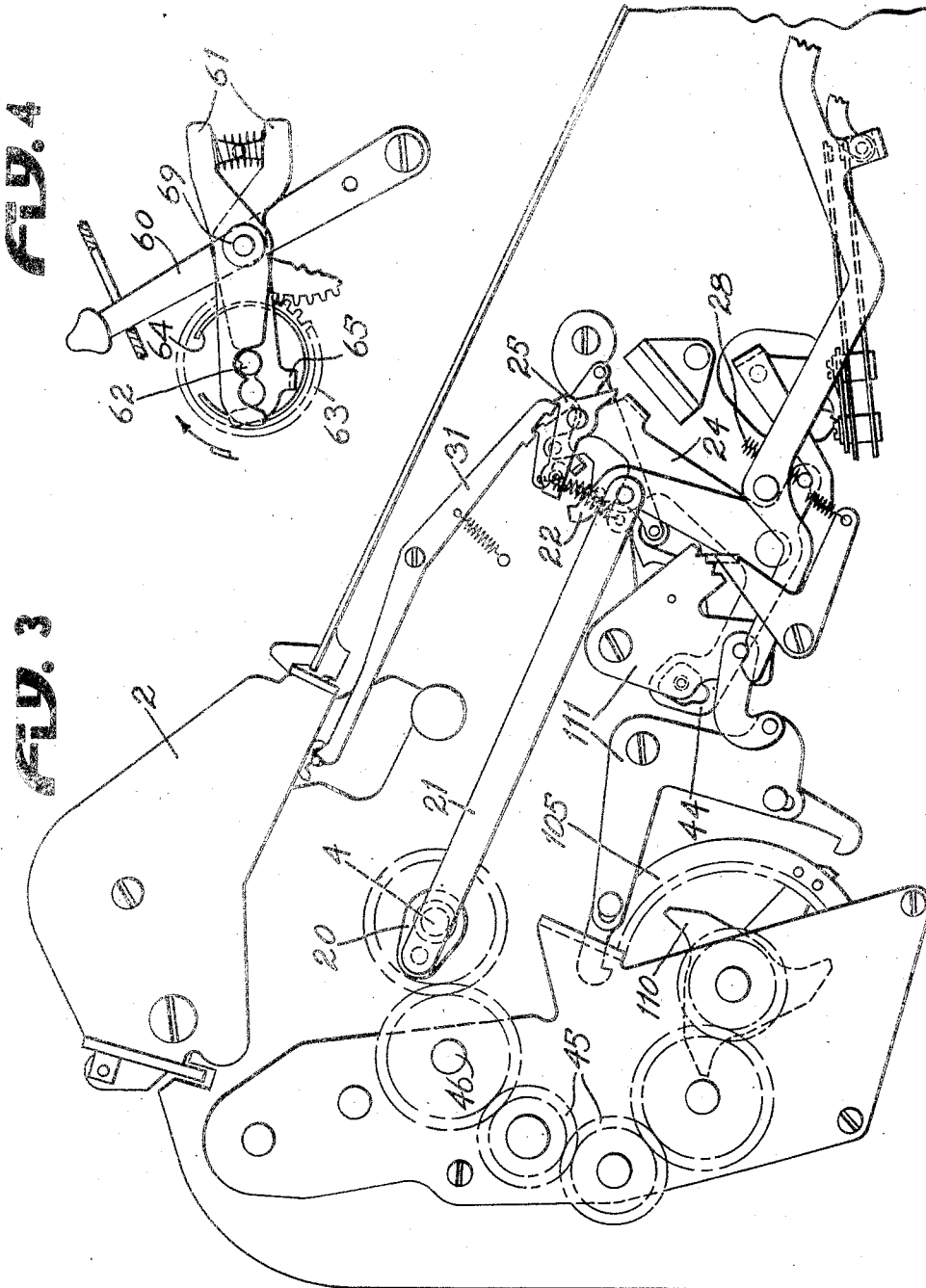
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2 Sheets-Sheet 2



WITNESS
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2,260,291

CALCULATING MACHINE

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Application June 14, 1940, Serial No. 340,481

3 Claims. (Cl. 235—79)

The invention has relation to calculating machines for the solution of problems in the four rules of arithmetic, and more particularly to means for automatically adjusting a multiplier-quotient register change lever.

United States Patent No. 1,400,004, issued on December 13, 1921, to Carl Schaller, shows means for automatically setting a multiplier-quotient register reversing gearing to effect registrations alternatively like or unlike (in arithmetic sign) the registrations upon a product-dividend register, the appropriate setting of the reversing gearing being effected in accordance with the sign of the initial registering movement.

The present invention operates upon the same principle, but is designed to allow a registration to be made under the control of a manual setting of the reverse gearing either to like or unlike registering position, without interference by the automatic setting devices, so that, for instance, complementary values may be registered.

The invention consists in the novel construction and combination of parts, as set forth in the appended claims.

In the accompanying drawings, illustrating the invention,

Fig. 1 is a fragmentary right side elevation of a calculating machine embodying the invention, with the casing removed.

Fig. 2 is a detail perspective view of the multiplier-quotient register reversing gearing.

Fig. 3 is a left side elevation of the machine, with the casing removed.

Fig. 4 is a detail right side elevation of the change lever and the automatic setting element.

In effecting registrations on the machine a clutching and reversing transmission mechanism of the type used in the known Monroe calculating machine is driven from a source of power not shown. Positive and negative registrations are controlled by compound clutch lever 111 (Fig. 3) and also disclosed in United States Patent No. 2,096,465, issued on October 19, 1937, to Austin A. Overbury. Rocking of clutch lever 111 in one or the other direction will serve to engage an addition or subtraction clutch element, 105, 110, holding said element against rotation and effecting additive or subtractive rotation of the driven member of the clutch.

The drive is transmitted through a train of gears 45 to a through shaft 46; thence through gearing 47 (Fig. 1) to a train of gears 48 and the differential actuators 5 for the product-dividend register 13. Driving connection is also made from gears 47 through a gear train 49 with the shaft

52 of a counting finger 71, adapted to operate any one of the wheels 85 of the multiplier-quotient register.

Shaft 52 is provided with eccentric hubs 5 mounted in the framing of the machine, and operates the counting finger 71 in the manner described in the United States patent to George C. Chase, No. 1,504,741, issued August 12, 1924.

Upon completion of the additive or subtractive registration in a given denominational shifted position of the register carriage 2, the clutch will be released and the parts brought to rest in full cycle position by the displacement of a trigger 31 (Fig. 3), this displacement being effected customarily by the release of an operation key in multiplication or by the movement of the register wheel 13 in division, as known, for instance, in the Monroe calculating machine.

Displacement of trigger 31 will release a spring pawl 25, mounted upon a rock arm 24, allowing said pawl to drop into position to engage a shoulder of a reciprocatory lever 22, driven from a shaft 4 (which is rotated in cycle with the differential actuators) through crank arm 20 and link 21. As the parts pass through full cycle position, lever 22 will carry rock arm 24 forwardly therewith, bringing a cam extension 44 of said arm into engagement with a centralizing pin on the clutch lever 111, and tensioning a spring 28. The clutch being disengaged by the action of extension 44, continued additive or subtractive movement of the parts will be arrested, and the actuators returned to full cycle position by the action of spring 28, reengagement of pawl 25 with trigger 31 serving to disconnect arm 24 from lever 22.

Since registration of the product of each multiplier digit comprises usually the net number of additions, and the calculation of the quotient digit comprises the net number of subtractions made in a given denominational position of the register carriage 2, the rotation of counting finger 71 should be driven so as to effect registrations in the wheels 85 which in multiplication are of the same sign as the registrations in the wheels 13, while in division the registration in wheels 85 should be of opposite sign to that of the registration in wheels 13.

To provide for this, reversing gearing (Fig. 2) is inserted in the drive train 49 of the multiplier-quotient register, consisting of two gears 53 and 54, loosely mounted on a driven shaft 55 and provided with clutch elements alternatively engageable by a slidable clutch element 56, keyed to shaft 55. Counting finger shaft 52 is driven oppositely by

the gears 53 and 54, because of the inter-position of an extra idler gear 57 in the train operated by gear 53.

The reversing gearing is controlled through a shipper plate 58, connected through link 59 with a change lever 60 (Fig. 1), which may be manually set toward the rear of the machine to provide for normal division registrations, and toward the front of the machine to provide for registration in multiplication.

Lever 60 is held either in its forward or in its rearward position or in an intermediate neutral position, by means of a pair of spring detents 61, pivoted upon lever 60 and provided with teeth engaging a shaft 62 to effect a cam locator action, a notch in shaft 62 also being designed to engage one of said teeth to locate the lever in intermediate position.

The means for automatically adjusting change lever 60 consists of a rotary member 63, loosely mounted on shaft 62, and driven by a train of one-to-one ratio gearing from the reversible rotary differential actuators 5. Member 63 is provided with a segmental flange 64, the ends of which flange lie, when the parts stand in full cycle position, at either side of a lug 65 of one of the detents 61. Upon rotation of the actuators in either direction, flange 64 will be brought in contact with lug 65 and lever 60 will be moved in one direction or the other, the tooth of the detent 61 escaping from the notch of shaft 62 and the detents being moved toward each other until the portions thereof located at the base of the teeth will contact shaft 62. This movement of the detents 61 will withdraw the lug 65 out of contact with the end wall of flange 64, and further rotation of the parts will bring the flange into the path of movement of the lug, whereby the change lever will be locked in adjusted position (Fig. 4) until the end of the cycle.

In order to allow time for the automatic adjustment of change lever 60, lost motion is provided between the teeth of the clutch elements 53, 54 and 56. When the machine is brought to rest, the overrun of the parts beyond full cycle position will complete the cycle of the driven clutch element, and the return of the parts to the full cycle position of the actuators will return the teeth of driving clutch element 56 into normal spaced relation with the teeth of the driven clutch. In order to hold the driven elements of the counting finger train in their normal position of rest, a spring 70 (Fig. 2) is designed to exert friction against the hub of shaft 52.

It is to be noted that when lever 60 is set into either effective position by a manual movement, the detent 61 will seat in the above described manner, and lug 65 will be brought out of the path of movement of flange 64, so that this manual adjustment of the change lever will not be disturbed upon operation of the machine.

At the end of a calculation in multiplication or division, various special operations are performed, such as the clearing of the registers, the

clearing of amounts set in the keyboard, etc. Advantage of this is taken to provide for the return of change lever 60 to its intermediate position, ready to be appropriately adjusted when the next operation is started.

For this purpose a key 66 (which may control the clearing of the keyboard, in known manner) is connected by link 67 with a lever 68, having opposed cam faces adapted to be brought into contact with a stud 69 of the change lever. Depression of key 66 will bring the cam faces of lever 68 into locating contact with the stud, whereupon the tooth of the detent 61 will locate in the notch of shaft 62. Upon release of the key, lever 68 will be returned to normal position by spring or other means, not shown.

I claim:

1. In a calculating machine having a multiplier-quotient register and driving means therefor including reversing gearing; control means for said reversing gearing including a manually adjustable change lever, means for holding said lever yieldably in either of two direction controlling positions or in a neutral position, and means operable upon operation of the machine to set said lever from neutral position alternatively into one or the other of its controlling positions said means being inoperative to move the lever from a controlling position.

2. In a calculating machine having a product-dividend register, reversible differential actuators therefor, a multiplier-quotient register and driving means therefor including reversing gearing; control means for said reversing gearing including a manually adjustable change lever, means for holding said lever yieldably in either of two direction controlling positions or in an intermediate neutral position, and means operable forwardly or reversely in accordance with the direction of operation of the differential actuators and acting to set said lever from neutral position alternatively into one or the other of its controlling positions said means being inoperative to move the lever from a controlling position.

3. In a calculating machine having a product-dividend register, reversible rotary differential actuators therefor, a multiplier-quotient register, and driving means therefor including reversing gearing; control means for said reversing gearing including a manually adjustable change lever, means for holding said lever yieldably in either of two direction controlling positions or in an intermediate neutral position, a projection movable with the change lever, and a rotary member having one-to-one ratio driving connection with the differential actuators and provided with a segmental flange acting to engage the projection, to set the lever from neutral position alternatively into and to lock it in one or the other of its controlling positions during an operative actuator cycle said means being inoperative to move the lever from a controlling position.

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