Oct. 9, 1962 R. M. LOGIE 3,057,548

POSITIVE RACK DRIVE FOR CALCULATORS

Filed Feb. 14, 1958 2 Sheets-Sheet 1

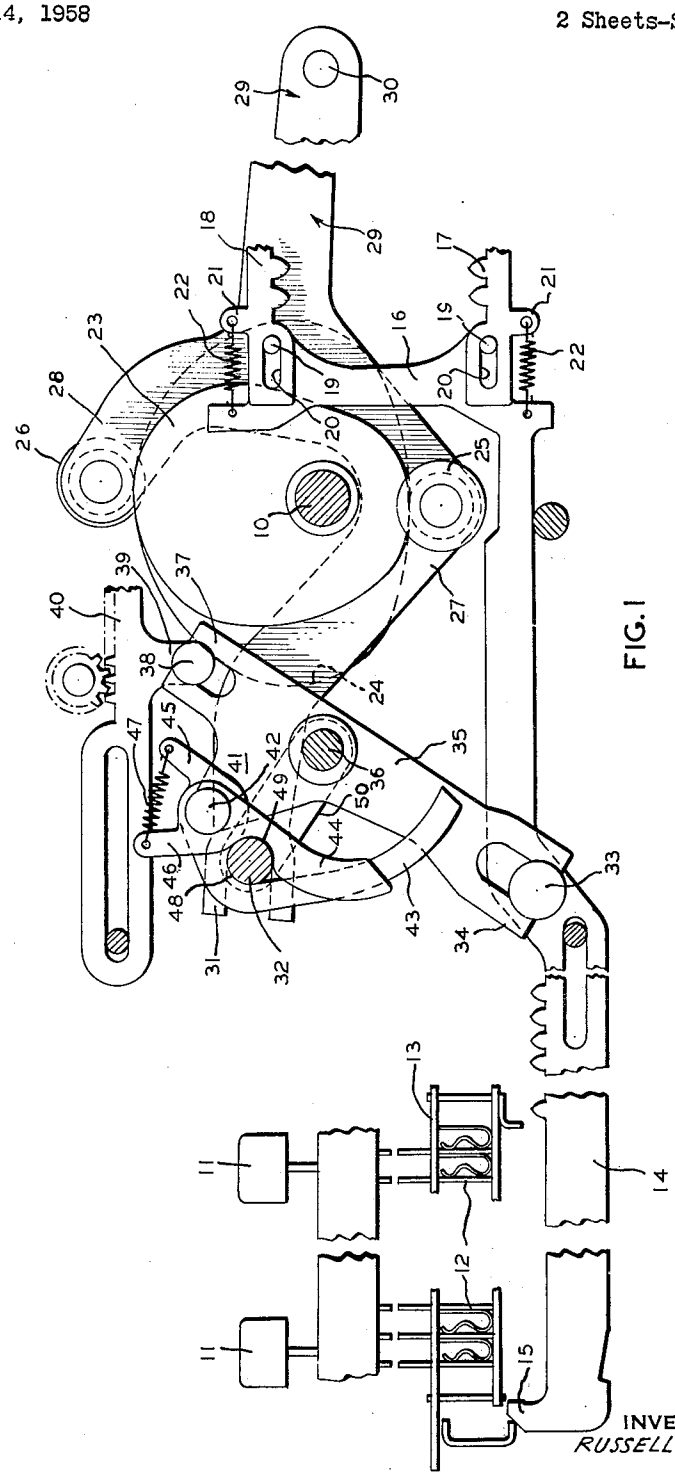

FIG. 1

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FIG. 2

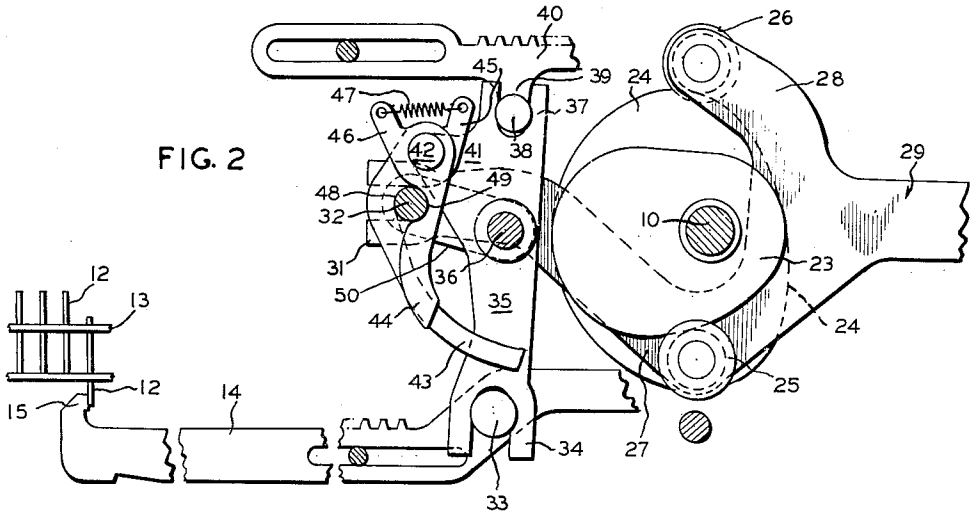


FIG. 3

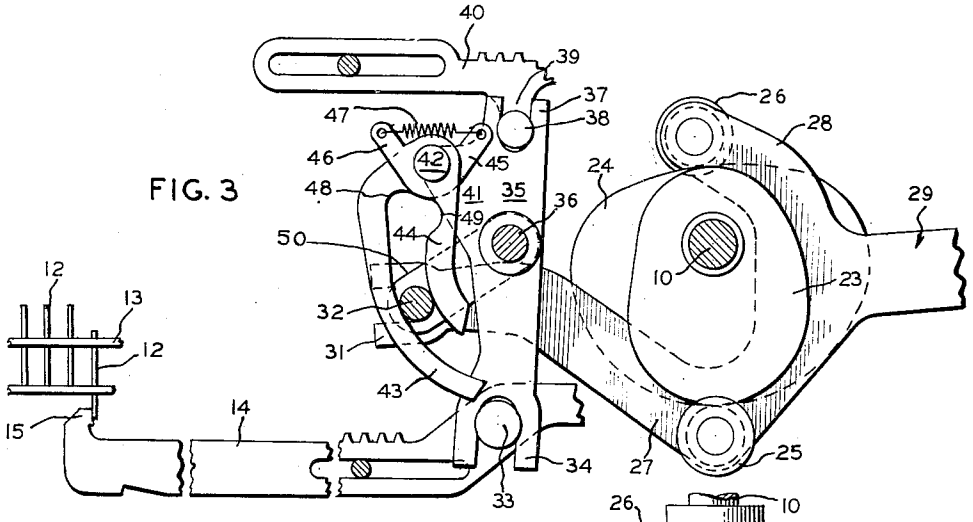
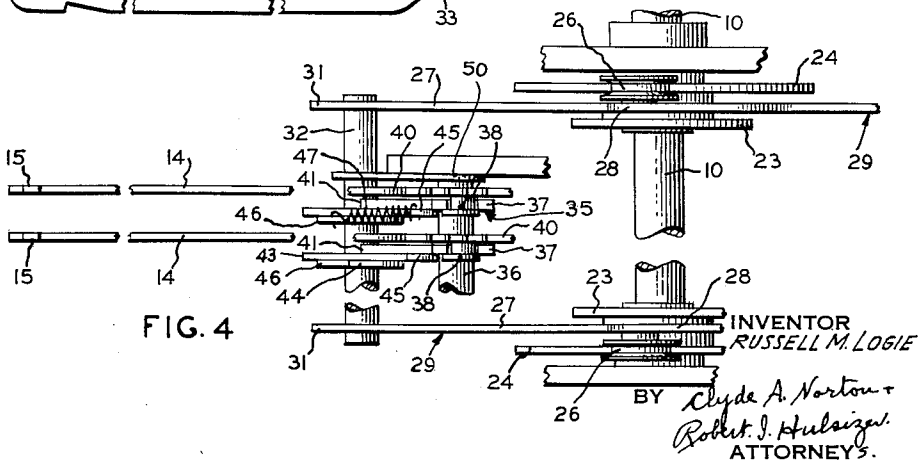


FIG. 4



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3,057,548

Patented Oct. 9, 1962

3,057,548

POSITIVE RACK DRIVE FOR CALCULATORS

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Filed Feb. 14, 1958, Ser. No. 715,342
4 Claims. (Cl. 235—60)

This invention relates to new and useful improvements in drive mechanisms and has particular reference to a drive mechanism for reciprocating racks in adding machines and the like.

Hitherto adding racks have been cyclically released and advanced by spring action until stopped by settable pins which are positioned by key depression.

An object of the invention is to drive the racks forward and backward in a positive manner so that the use of springs is eliminated.

A further object is to provide a construction which has a much lower power requirement.

Still another object is to provide a construction which can be operated easily by cams on a continuously revolving cam shaft which can be built into various spacings with relatively simple parts.

In brief and general terms, the invention includes a reciprocating driving element, a reciprocating driven element, means for selectively interrupting the reciprocation of the driven element and a yieldable connection between the driving and driven elements to permit the driving element to continue its reciprocation even though the reciprocation of the driven element is interrupted. The word "reciprocation" is intended to include motion to and fro in an arc or in a straight line.

More particularly, the invention includes an oscillating lever which is driven in constant engagement with a pair of complementary cams on a rotating drive shaft. A drive rod is supported from said arm and oscillates therewith. A pair of yieldable spring pressed fingers embrace said rod. These yieldable fingers are on one end of a driven element or pivoted lever the other end of which is associated with an adding rack slide. The adding rack slide is constructed in the usual manner to be interrupted in its movement by depressed pins in the usual pin box. Therefore the movement of the adding rack slide is irregular. However, the reciprocation or oscillation of the driving lever is constant. The stroke of the drive lever is greater than that of the driven lever so that wherever the driven lever is stopped the connections between the two levers yield to permit the driving lever to proceed to the end of its stroke. On the return of the driving lever the yielding connection is reestablished and the driven lever is returned to its normal initial position.

A present preferred form which the invention may assume is illustrated in the drawings, of which

FIG. 1 is a side elevation of the mechanism;

FIG. 2 is a partial side elevation of the device with an adding rack in forward stopped position and with the yieldable connection still engaged;

FIG. 3 is a similar view showing the yieldable connection broken and the driving element in its foremost position; and

FIG. 4 is a partial plan view of the parts shown in FIG. 3.

Referring now in detail to the present preferred form of the invention showin in the drawing, there is a constantly rotating drive shaft 10 driven by any suitable source of power (not shown) whenever the power is turned on. There is also a set of the usual keys 11 which, when depressed, are adapted to set pins 12 in a pin box 13 of a well known type.

The slide of one order is shown in the drawings and

comprises, a forward portion 14 with an upright heel 15 at the end thereof. This heel 15 is adapted to abut any one of the pins 12 when depressed as shown in FIG. 3, thus stopping the rearward movement of the slide in the usual manner. The rear end of the slide 14 has a vertical portion 16 to the upper and lower portions of which are connected the adding and subtracting racks 17 and 18 by means of pins 19 in the slide and slots 20 on the racks. The racks are provided with projecting ears 21 between which ears and the slide portion 16 springs 22 extend as shown.

In order to drive the various parts of this device, the drive shaft 10 is provided with a pair of fixed complementary cams 23 and 24 which are respectively and continuously engaged by rollers 25 and 26 mounted on spaced arms 27 and 28 of a driving or operating cam lever 29 pivoted at a fixed point 30. The arm 27 is extended forwardly and is forked at 31 to embrace a drive rod 32. This rod 32 extends across all the orders of the machine so as to be embraced by forks of similar arms 27 for the other orders thereof. From a consideration of FIG. 4, it will be seen that there are two sets of complementary cams and two sets of arms with rollers resting on said cams, the outer end of said arms engaging the respective outer ends of the drive rod 32.

It will be observed that the operation of the drive mechanism thus far explained will result in the up and down reciprocation of the drive rod 32 in a generally vertical direction along a slight arc of travel. In order to make this movement effective in driving the slide 14, it is to be noted that the slide 14 has a roller 33 thereon which is embraced by the forked lower end 34 of a rack driving lever 35 pivoted on a shaft 36. The upper end of this lever 35 is also forked as at 37 to embrace a roller 38 on a dependent ear 39 of a rack 40 which is associated in a manner not shown with the printing wheels of the device. It is clear that as lever 35 is rocked back and forth the slide 14 is moved forward and backward.

To examine how the lever 35 is thus rocked it will be noted that intermediate its ends it has a lateral integral extension 41 on which is fixed a stud 42. On this stud are rotatably mounted two scissor-like fingers 43 and 44. At their upper ends these fingers have ears 45 and 46 between which extends a spring 47 which tends normally to pull them together in the position shown in FIG. 1. It is noted that these fingers have curved recesses or notches 48 and 49 on adjacent edges which form an embracing seat for the drive rod 32 when the fingers are in their normal closed position. The finger 43 is curved and at its end overlaps the adjacent face of the lower end of the driven lever 35, and in any position of this lever the overlap is maintained. The curved finger 44 is shorter than the finger 43 and, as shown in FIG. 2, lies in a plane adjacent to that of the finger 43. Straps 50 are provided with end apertures which receive respectively the rod 32 and the shaft 36 of the driven lever so as to maintain the arcuate travel of the rod 32.

Summarizing the operation of the device, it will be noted that when a key 11 is depressed it moves a pin 12 downwardly in the manner usual with machines using pin boxes. The lower end of this pin is thus disposed in the path of the heel 15 of the slide. When, in the usual course of operation, the power is then applied, the shaft 10 starts to rotate and the cams 23 and 24 will through the rollers 25 and 26 start to reciprocate the drive lever 29. This will cause the drive rod 32 to start reciprocating from the position shown in FIG. 1, thus rocking the lever 35 and advancing the slide 14 until the heel 15 encounters the lower end of the depressed pin 12 as shown in FIG. 2. The movement of the slide has of course also moved the racks 17 and 18 in the usual manner

and their movement has caused the rotation of the accumulator wheels (not shown) associated therewith. The drive rod **32** under the impulse of the cams continues to reciprocate to the end of its stroke and, since the driven lever **35** cannot further reciprocate the rod forces the fingers **43** and **44** apart against the action of the spring **47** until it reaches the end of its stroke as shown in FIG. 3 whereupon the cams start to move the drive rod on its return stroke until it is seated again in the curved recesses or seats in the adjacent faces of the fingers **43** and **44**, and then restores the lever **35** to normal position.

It will thus be seen that I have provided a simple, efficient and accurate structure which will reciprocate the racks and associated parts in a positive manner without a material play and without the use of the usual restoring springs.

While the invention herein has been fully shown and described in detail with respect to one present preferred form which it may assume, it is not to be limited to the specific form shown since many changes and modifications may be made in the structure to meet different practical problems without departing from the spirit and scope of the invention in its broadest aspects. Hence it is desired to cover any and all forms and modifications of the invention which may come within the spirit and scope of any one or more of the appended claims.

What is claimed is:

1. In a calculating machine, the combination with upper and lower calculating and printing rack slides movable in opposite directions and a constantly operating drive shaft; of a cam lever pivoted at one end, cam means for positively reciprocating the free end of the cam lever, a rack drive lever pivoted intermediate its ends for lateral rocking movement and having a lateral extension, said rack drive lever being connected at its opposite ends to said slides for sliding said calculating rack and a printing rack in opposite directions, a drive rod common to all of said racks and supported in the free end of said cam lever for vertical reciprocating movement, a pair of scissor fingers shaped to provide a seat for said drive rod and pivoted to said extension for rocking said rack drive lever upon movement of said drive rod, and means for holding the fingers engaged with said drive rod, said last mentioned means yielding for passage of the drive rod between said fingers when the movement of the calculating slide in one direction is blocked whereby the operating movement of the drive rod and the cam lever may continue.

2. In a calculating machine, the combination with plural orders of accumulators and calculating rack slides for governing the operation of said orders individually, key controlled settable pins to limit the movement of the rack slides in set position printing racks and a constantly operating drive shaft; of a cam lever pivoted at one end, cam means for positively oscillating the free end of the cam lever, a drive rod in the free end of said

cam lever common to all of said orders of accumulators, a rack drive lever for each rack slide pivoted intermediate its ends for lateral rocking movement and having a lateral extension, said rack drive lever being arranged at its opposite ends for sliding a calculating rack and a printing rack in opposite directions, a pair of scissor fingers shaped to provide a retaining seat for said drive rod and pivoted to said extension for rocking said rack drive lever upon movement of said drive rod, means for holding the fingers in rod retaining position, and said holding means yielding for passage of said rod out of the seat and between the fingers when the movement of the corresponding calculator rack slide in one direction is blocked by a settable pin in set position, whereby said drive rod and cam lever may continue to one extreme limit of reciprocation.

3. In a calculating machine, a pivoted driving lever, cam means for moving said lever to impart to a free end of the lever a positive reciprocating motion, a drive rod engaging the free end of said driving lever, a pivoted driven lever adapted to be rocked, a pair of scissor fingers pivotally mounted on the driven lever and embracing the drive rod therebetween to rock said driven lever by a pull through said fingers, spring means connected to said fingers to urge them into gripping engagement with said drive rod, and means for interrupting the rocking movement of said driven lever, said fingers yielding to pass the rod therebetween when the movement of the driven lever is interrupted.

4. In a calculating machine, pivoted driving lever means, cam means for moving said lever means to impart to said lever means a reciprocating motion, a drive rod engageable with said driving lever means, a pivoted driven lever adapted to be rocked, a pair of fingers pivotally mounted on the driven lever and embracing the drive rod therebetween to rock said driven lever by a pull through said fingers, spring means connected to said fingers to urge them into gripping engagement with said rod, a slide engageable by said driven lever and moved thereby, in opposite directions, an upright heel on an end of said slide, a pin box, depressible pins therein, keys to be depressed to move the pins into a position to be engaged by said heel whereby the motion of the slide in a given direction may be interrupted, and said fingers yielding their engagement of the rod to pass the latter therebetween when the movement of the driven lever is interrupted.

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