Jan. 9, 1951 S. A. E. LUNDIN 2,537,227

CARRIAGE SHIFT MECHANISM

Filed April 1, 1948 3 Sheets-Sheet 1

FIG. 1

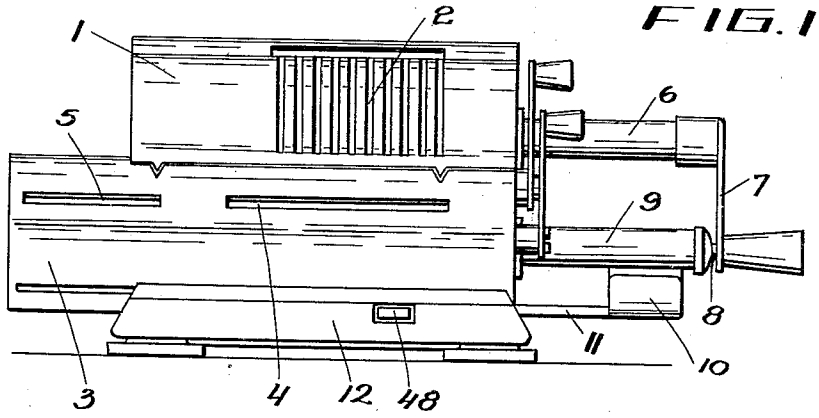


FIG. 4

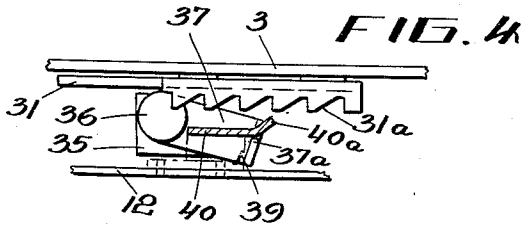


FIG. 6

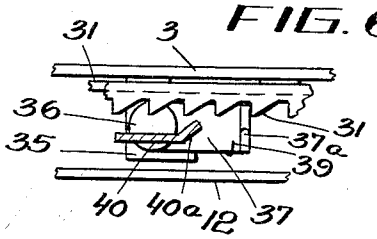
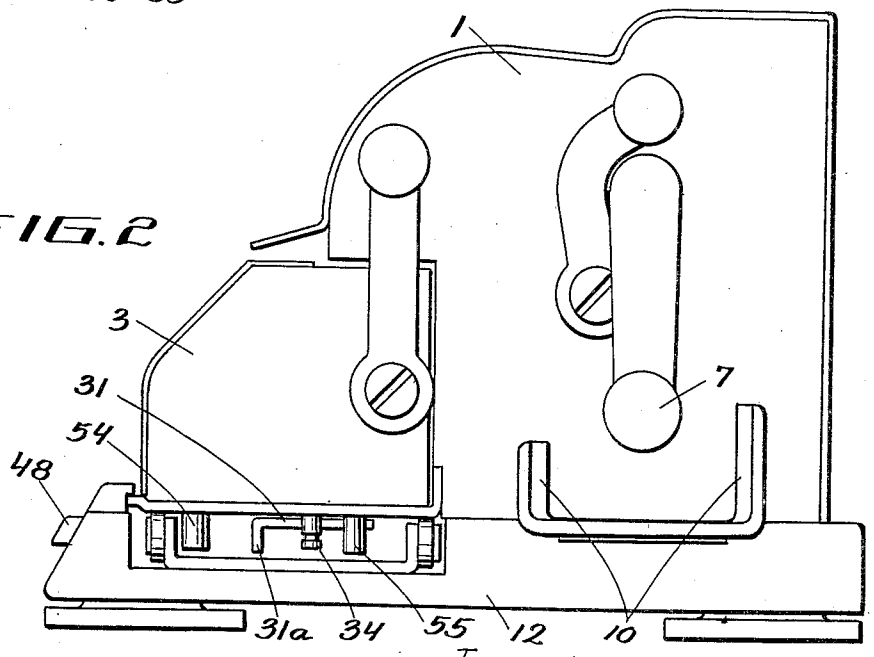


FIG. 2



Inventor
Sven Axel Evert Lundin
By C. F. Wenderoth
Attorney

Jan. 9, 1951 S. A. E. LUNDIN 2,537,227

CARRIAGE SHIFT MECHANISM

Filed April 1, 1948

3 Sheets-Sheet 2

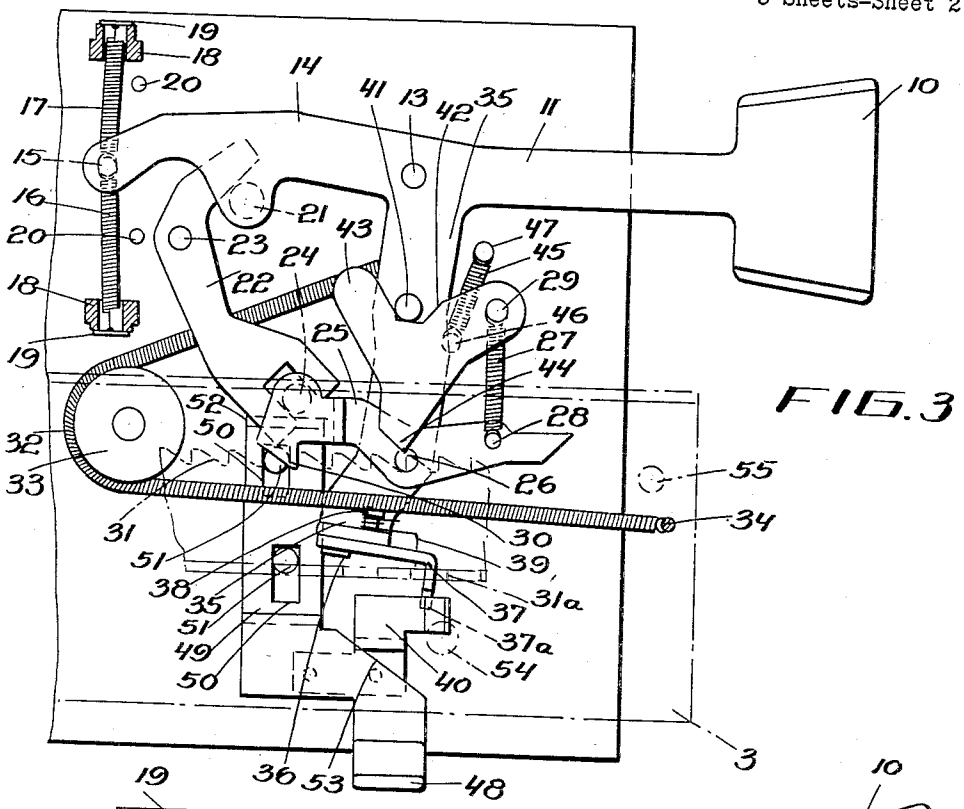


FIG. 3

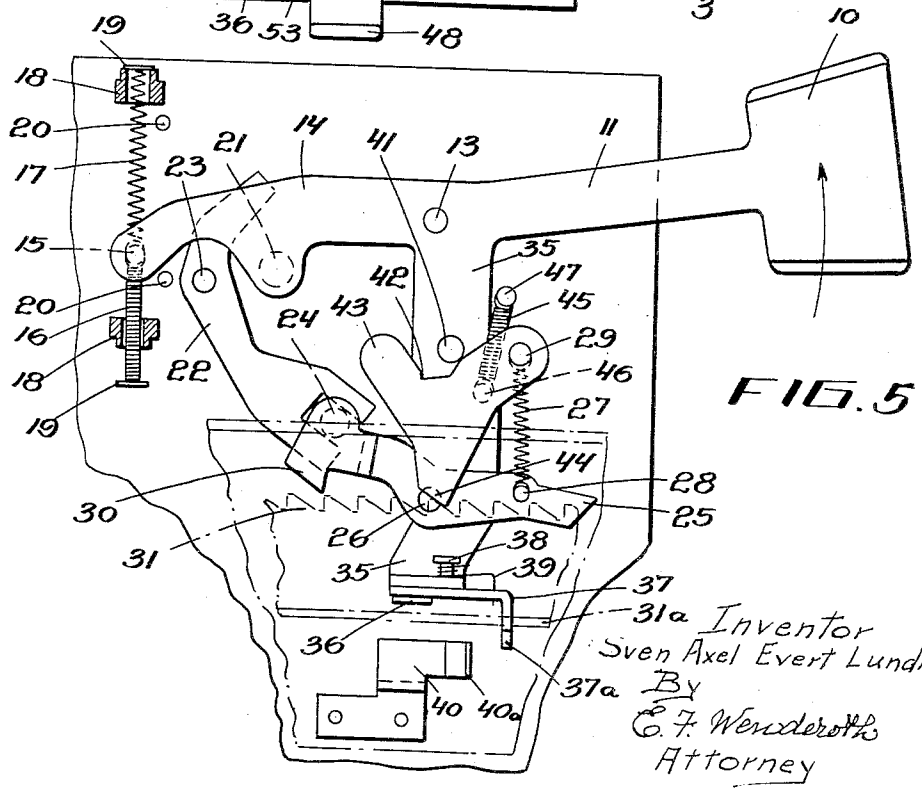


FIG. 5

Inventor
Sven Axel Evert Lundin
By
C. F. Wenderoth
Attorney

Jan. 9, 1951

S. A. E. LUNDIN

2,537,227

CARRIAGE SHIFT MECHANISM

Filed April 1, 1948

3 Sheets-Sheet 3

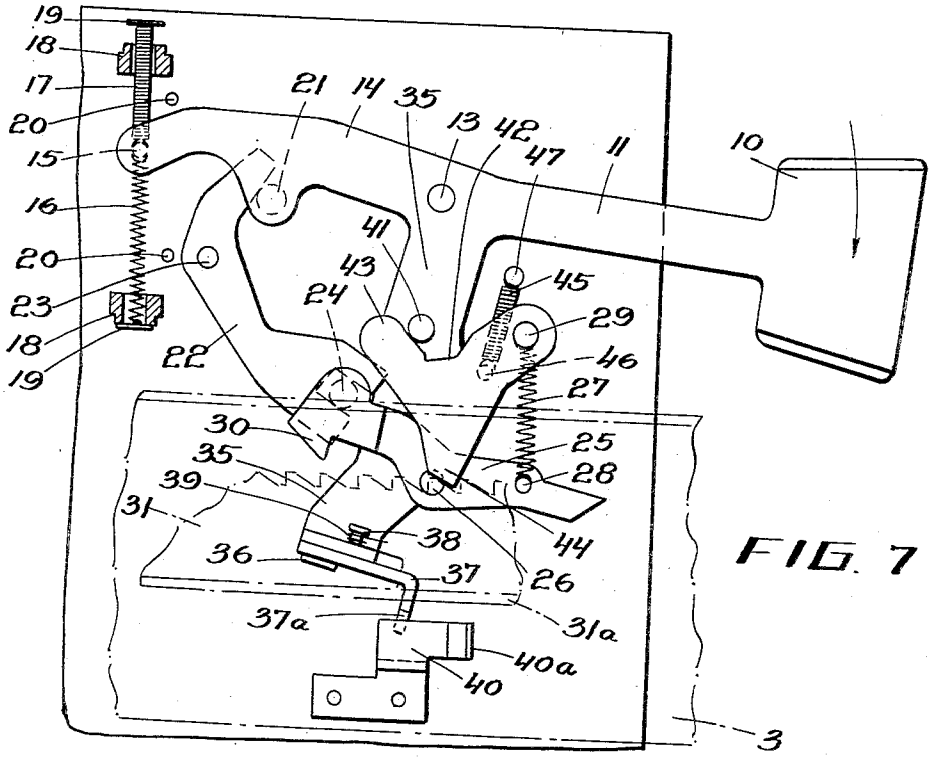


FIG. 7

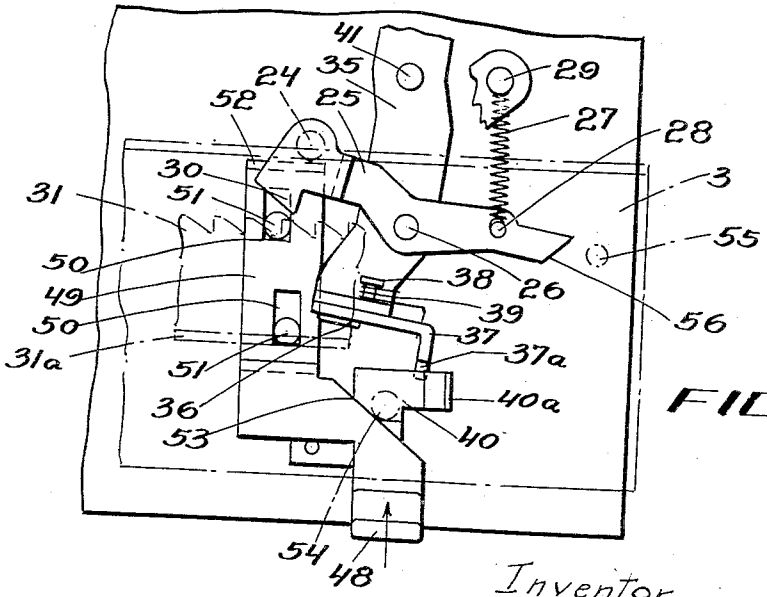


FIG. 8

Inventor
Sven Axel Evert Lundin
By
C. F. Wenderoth
Attorney

Patented Jan. 9, 1951

2,537,227

UNITED STATES PATENT OFFICE

2,537,227

CARRIAGE SHIFT MECHANISM

Sven Axel Evert Lundin, Malmo, Sweden, assignor to Aktiebolaget Addo, Malmo, Sweden, a corporation of Sweden

Application April 1, 1948, Serial No. 18,406
In Sweden April 2, 1947

4 Claims. (Cl. 235—63)

1

This invention relates to a carriage shifting device for manually operated calculating machines of the Odhner-type.

One of the principal objects of the invention is to provide a carriage shifting device for a machine of the above-mentioned type in which the carriage is urged in one direction by spring means and is shifted in both directions by means of a new and improved control mechanism.

Another important object of the invention is to provide a carriage shifting device for a calculating machine of the above-mentioned type having release means enabling rapid shifting of the carriage to one end of its path by means of a spring.

Other objects and advantages of the invention will be apparent to those skilled in the art from the following description of a preferred embodiment of the invention shown in the accompanying drawings in which

Fig. 1 shows a manually operated calculating machine of the Odhner-type with a device according to the invention, as seen from in front,

Fig. 2 shows the machine of Fig. 1, as seen from the right in relation to the last-mentioned figure,

Fig. 3 shows the carriage shifting device according to the invention, as seen from above, the carriage of the machine being indicated by means of dash and dot lines and the parts occupying initial or normal position,

Fig. 4 shows a detail of Fig. 3, as seen from the front of the machine, the front parts of the machine being omitted for the sake of clearness,

Figs. 5, 7 and 8 correspond to Fig. 3 and show different working positions of the carriage shifting device,

Fig. 6 corresponds to Fig. 4 and shows a working position of the detail in question.

In the drawings only those parts of the machine have been shown which are necessary for a full understanding of the invention, whereas all other details have been omitted for the sake of clearness.

Referring to the drawings, the calculating machine as usual has a machine frame 1 with a value entering mechanism 2 and a carriage 3 shiftable laterally of the machine frame at the front thereof into several different working positions. The carriage 3 comprises a result or product register 4 and a revolutions counting or multiplier register 5. The machine as usual has a tube 6 projecting from the right end wall thereof and surrounding a shaft for the operating crank handle 7 of the machine which is

2

retainable in an initial or normal position in which a pin 8 displaceable against the action of a spring enters a tube 9 projecting from the machine end wall and surrounding a locking mechanism operable by the pin 8, for making impossible setting of the value entering mechanism 2 and the carriage 3 when the crank 7 is not in its initial position. This locking mechanism is of a known type and is of no importance for the understanding of the invention, for which reason it has not been shown in the drawings.

Below the tube 9 there is arranged adjacent the operating crank 7 occupying initial position, a handle portion 10 of one single control means in the form of a lever 11 for stepwise shifting the carriage 3 from working position to working position. On swinging the lever 11 from the initial or normal position in one direction the carriage is shifted one step in one direction, and on swinging the lever from the initial position in the other direction the carriage is shifted one step in the other direction. It is very convenient and easy to swing the lever 11 with the hand used for rotating the operating crank 7 without the help of the other hand.

The shifting mechanism for the carriage 3, operated by the lever 11 will now be described with reference to Figs. 3 to 8. Figs. 3 and 4 show the lever 11 and the parts controlled thereby in initial position. The lever 11 is pivotally mounted about a pivot 13 secured to the base plate 12 of the machine, and on the side of the pivot 13 opposite to the handle portion 10 said lever has an arm 14 with a pin 15 to which two tension springs 16 and 17 extending in opposite directions are fixed and the ends of said springs each pass through a hole in a pair of lugs 18 on the base plate 12. The free ends of the springs 16 and 17 each carry a stop plate 19 which cannot pass through the holes in the lugs 18 and consequently, in the unactuated state of the lever 11, hold the tension springs 16, 17 under a certain tension, whereby the lever 11 is held in the initial position shown in Fig. 3. The swinging of the lever 11 in either direction is limited by a pair of stops 20 which are fixed to the base plate 12 and against which the arm 14 abuts on a maximum deflection of the lever.

The arm 14 has a pin 21 for operating the one arm of a two-armed lever 22 which is pivotally mounted about a pin 23 on the base plate 12. The other arm of the lever 22 is fork-shaped and engages with its fork prongs a pin 24 arranged on a latch pawl 25. The latter is pivoted about a pivot 26 mounted on the base plate 12, and a

spring 27 which is extended between a pin 28 on the latch pawl and a pin 29 on the base plate 12, tends to hold the nose 30 of the latch pawl in engagement with a rack 31 fixed to the under side of the carriage 3. The rack 31 is saw-toothed and a spring 32 holds the steep flank of one of the teeth of the rack in contact with the pawl nose 30. Said spring 32 which is passed over a pulley 33 mounted on the base plate 12 and extends between a pin 34 on the carriage 3 and a pin (not shown) on the base plate, tends to move the carriage into the working position shown in Fig. 1, in which the unit decades of the value entering mechanism 2 and the result or product register 4 are opposite each other. For making possible an exact adjustment of the carriage in its different ordinal positions it is thus only necessary to machine the steep flanks of the teeth of rack 31 with the necessary precision, which is very simple from the point of view of manufacture.

The lever 11 also has an arm 35 forming approximately a right angle with the arm 14. The end of the arm 35 is bent at right angles to the plane of the lever 11 and carries a pivot 36 about which a feed pawl 37 is pivotally mounted. On the bent end of the lever arm 35 there is also fixed a pin 38 onto which a torsion spring 39 is passed, said spring tending to move the feed pawl 37 into engagement with a saw-toothed portion 31*a* arranged on a downwardly bent flange of the rack 31. In the initial position of the parts, shown in Figs. 3 and 4 the feed pawl 37 is however held out of contact with the toothed portion 31*a* by a cam plate 40 secured to the base plate 12 and against the under side of which a rounded-off edge 37*a* of the feed pawl 37 is held pressed by the spring 39.

As will readily be seen by those skilled in the art, it would of course also be possible to arrange the feed pawl so as to cooperate with the same toothed portion as the latch pawl 25, but in the embodiment shown it is best, for reasons of space, to have separate toothed portions for the latch pawl and the feed pawl.

The arm 35 of the lever 11 also has a pin 41 engaging in a substantially V-shaped recess 42 provided in a checking means 43 which is pivotally mounted about the pivot 29 fixed to the base plate 12. The checking means 43 has a nose 44 which is adapted to engage the rack 31 but which, in the initial position of the parts illustrated in Fig. 3, is held out of contact with the rack by a spring 45 extending between a pin 46 on the checking means and a pin 47 on the base plate 12.

The mechanism described functions in the following manner. When manually operating the handle portion 10 of the lever 11 in the direction indicated by means of an arrow in Fig. 5, the lever is swung counter-clockwise from the position according to Fig. 3 to and past the position according to Fig. 5 until the arm 14 of the lever comes into contact with the one stop 20. Thereby the rounded-off edge 37*a* of the feed pawl 37 mounted on the lever arm 35 slides upwardly along the right end portion 40*a* of the cam plate 40, which portion is inclined upwardly, the torsion spring 39 swinging the feed pawl into engagement with the toothed portion 31*a*. This engagement is realized already at an early moment of the swinging movement of the lever 11 and upon continued swinging of the lever the carriage 3 will be moved, against the action of the spring 32, to the right through a distance that is somewhat larger than the distance between two working positions (one pitch of teeth of the rack). During said displacement of the carriage 3 by means of the feed pawl 37 the nose 30 of te latch pawl 25 slides up along the inclined side of the rack tooth which is situated to the left of the nose (in the position according to Fig. 5 the nose 30 has just reached the top of the tooth) and extends the spring 27. Since the carriage 3 is displaced somewhat more than through the distance between two working positions of the carriage, the latch pawl nose 30 will fall down into the clearing between two teeth situated to the left of the clearing in which the latch pawl engages in Fig. 3, by the action of the spring 27 at the end of the swinging movement of the lever 11. During the swinging movement of the lever 11 in counter-clockwise direction, the pin 41 of the lever arm 35 slides along the right inclined side wall of the V-shaped recess 42 provided in the checking means 43 and swings said means counter-clockwise against the action of the spring 45 so that the nose 44 of the checking means projects into a clearing between two teeth of the rack 31. The carriage 3 is thereby prevented from being displaced through more than one step, if the lever 11 is very violently swung in counter-clockwise direction.

During the return movement of the parts to the initial or normal position according to Figs. 3 and 4 by the action of the lever spring 17, the feed pawl 37 first of all slides over the top of a tooth of the rack portion 31*a* and is then lifted away from said rack portion owing to the fact that the edge 37*a* of the pawl slides down along the inclined portion 40*a* of the cam plate 40.

On swinging the lever 11 in clockwise direction from the initial position according to Fig. 3 to the position according to Fig. 7, the pin 21 of the lever arm 14 swings the two-armed lever 22 in counter-clockwise direction, the fork-shaped end of the latter lifting the nose 30 of the latch pawl 25 out of engagement with the rack 31, so that the spring 32 is able to move the carriage to the left. However, this movement is not permitted to continue through more than one pitch of teeth of the rack 31, while the pin 41 of the lever arm 35 slides towards the left side wall of the V-shaped recess 42 in the checking means 43 and thereby swings the nose 44 of said checking means down into a clearing between two teeth of the rack 31 in such a position that the movement of the carriage caused by the spring 32 is interrupted shortly before it has been moved through a distance corresponding to one pitch of teeth of the rack. During the return movement of the lever 11 to the initial position by the action of the spring 16, the nose 30 of the latch pawl 25 may freely swing into the clearing between two teeth of the rack 31 lying to the right of the clearing in which the nose was engaged before the lever was swung. When the nose 44 of the checking means 43 leaves the rack 31 during the return stroke of the lever 11, the spring 32 finally moves the steep tooth flank limiting towards one side the clearing in which the nose 30 of the latch pawl 25 engages, into contact with the latch pawl nose, whereafter the parts again occupy the normal position according to Fig. 3.

During the swinging of the lever 11 clockwise into the position according to Fig. 7 and its return movement to the initial or normal position, the rounded-off edge 37*a* of the feed pawl 37

slides against the under side of the plate 40, which is parallel to the rack 31, so that the feed pawl is always held out of engagement with the toothed portion 31a.

As will readily be seen the carriage 3 can be moved to the right through one or more steps in one movement against the action of the spring 32 simply by manually operating the carriage, the nose 30 of the latch pawl 25 sliding up along the inclined tooth flanks of the rack 31 in turn and falling down into the following clearings by the action of the spring 27.

In order rapidly to move the carriage from any working position to the position shown in Fig. 1 in which the unit decade of the result or product register 4 is situated opposite the unit decade of the value entering mechanism 2 a carriage shifting key 48 is arranged. This key is placed in front of the machine in a recess provided in the base plate 12 and has a shaft 49 with a pair of rectangular apertures 50 through which a pair of bearing pins 51 on the base plate pass. The apertures 50 and the pins 51 form a bearing for the key 48 so that said key is displaceable forwards and backwards in the machine. At the rear the key shaft 49 has an upwardly bent flange 52 which is situated in front of the pin of the latch pawl 25. Upon depression of the key 48 the flange 52 bears against the pin 24 and swings the nose 30 of the latch pawl 25 out of engagement with the rack 31 (see Fig. 8), so that the spring 32 is permitted to move the carriage 3 to the left. The shaft 49 of the key 48 has an inclined cam surface 53 which shortly before the arrival of the carriage 3 at the position according to Fig. 1, is struck by a pin 54 provided on the carriage, the arrangement being such that by its contact with the cam surface 53 the pin 54 tends to move the key 48 back into initial position against the action of the finger pressure exerted on the key. Thereby the movement of the carriage 3 is softly braked and at the same time the latch pawl 25 is released by the key 48 returning to the initial position and by the action of the spring 27 said latch pawl 25 can swing into engagement with the rack 31 for retaining the carriage 3 in the end position shown in Fig. 1.

In order that the latch pawl 25 may securely engage with the nose 30 of the rack 31 when the carriage 3 reaches the left end position according to Fig. 3, independently of the action of the spring 27, the carriage 3 is provided in the embodiment shown with the pin 55 striking a cam surface 56 on the latch pawl 25 immediately before the carriage reaches the left end position and thereby causing the latch pawl 25 to engage the rack 31. By providing the pins 54 and 55 and the cam surfaces 53 and 56 cooperating therewith it is not necessary to arrange any special stop for the limitation of the movement of the carriage 3 to the left.

Of course, the invention must not be considered as limited to the embodiment shown in the drawings for considerable modifications may be resorted to without departing from the scope of the appended claims.

What I claim and desire to secure by Letters Patent is:

1. In a manually operated calculating machine of the Odhner-type having a frame, a value entering mechanism in said frame, an operating handle on said frame for manually operating said value entering mechanism, a carriage ordinarily shiftable on said frame in relation to said value entering mechanism, and register means on said carriage, cooperating with said value entering mechanism for calculating operations, a carriage shifting device comprising spring means urging said carriage in one direction, rack means on said carriage, a latch pawl on said frame cooperating with said rack means to hold said carriage against the action of said spring means, a manually operable control lever adjacent said operating handle, a feed pawl on said control lever, said control lever being adapted to move said feed pawl into engagement with said rack means, when swung in one direction from a normal position, for shifting said carriage against the action of said spring and, when swung in the other direction from said normal position, being adapted to release said latch pawl from said rack means to allow said spring means to shift said carriage, and checking means operable by said control lever to engage said rack means for limiting the shifting of said carriage by said spring means whereby said operating handle and control lever may be operated by one hand of the operator.

2. A carriage shifting device according to claim 1 in which said rack means comprises two series of teeth, one of said series cooperating with said feed pawl and the other cooperating with said latch pawl.

3. In a manually operated calculating machine of the Odhner-type having a frame, a value entering mechanism in said frame, an operating handle on said frame for manually operating said value entering mechanism, a carriage ordinarily shiftable on said frame in relation to said value entering mechanism, and register means on said carriage, cooperating with said value entering mechanism for calculating operations, a carriage shifting device comprising spring means urging said carriage in one direction, rack means on said carriage, a latch pawl on said frame cooperating with said rack means to hold said carriage against the action of said spring means, a control lever having its manually operative end closely adjacent said handle for disengaging said latch pawl from said rack means when operated to allow said spring means to shift said carriage, checking means operable by said control lever to engage said rack means for limiting the shifting of said carriage by said spring means, manually operable means for disengaging said latch pawl from said rack means independently of said control lever to allow said spring means to move said carriage to one end of its path, and means operable by said carriage when said carriage reaches said end of its path for reengaging said latch pawl with said rack means.

4. In a manually operated calculating machine of the Odhner-type having a frame, a value entering mechanism in said frame, an operating handle on said frame for manually operating said value entering mechanism, a carriage ordinarily shiftable on said frame in relation to said value entering mechanism, and register means on said carriage, cooperating with said value entering mechanism for calculating operations, a carriage shifting device comprising spring means urging said carriage in one direction, rack means on said carriage, a latch pawl on said frame cooperating with said rack means to hold said carriage against the action of said spring means, a control lever having its manually operative end located adjacent said handle, a feed pawl on said control lever movable by said control lever into engagement with said rack means, when swung in one direction from a normal position, for shifting the

carriage against the action of said spring and when swung in the other direction from said normal position, releasing said latch pawl from said rack means to allow said spring means to shift said carriage, checking means operable by said control lever to engage said rack means for limiting the shifting of the carriage by said spring means, manually operable means for disengaging said latch pawl from said rack means independently of said control lever to allow said spring means to move said carriage to one end of its path, and means operable by said carriage when said carriage reaches said end of its path for reengaging said latch pawl with said rack means.

SVEN AXEL EVERT LUNDIN.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,983,625	Luttropp	Dec. 11, 1934
1,986,888	Friden	Jan. 8, 1935
2,033,088	Avery	Mar. 3, 1936
2,034,345	Kottmann	Mar. 17, 1936
2,243,075	Anneren et al.	May 27, 1941

FOREIGN PATENTS

Number	Country	Date
41,227	Sweden	May 30, 1914
381,134	Germany	Sept. 15, 1923