Dec. 2, 1969 J. G. CLARY 3,481,536

STOP PIN RETRACTING MEANS FOR TEN KEY CALCULATING MACHINE

Filed April 24, 1968 2 Sheets-Sheet 1

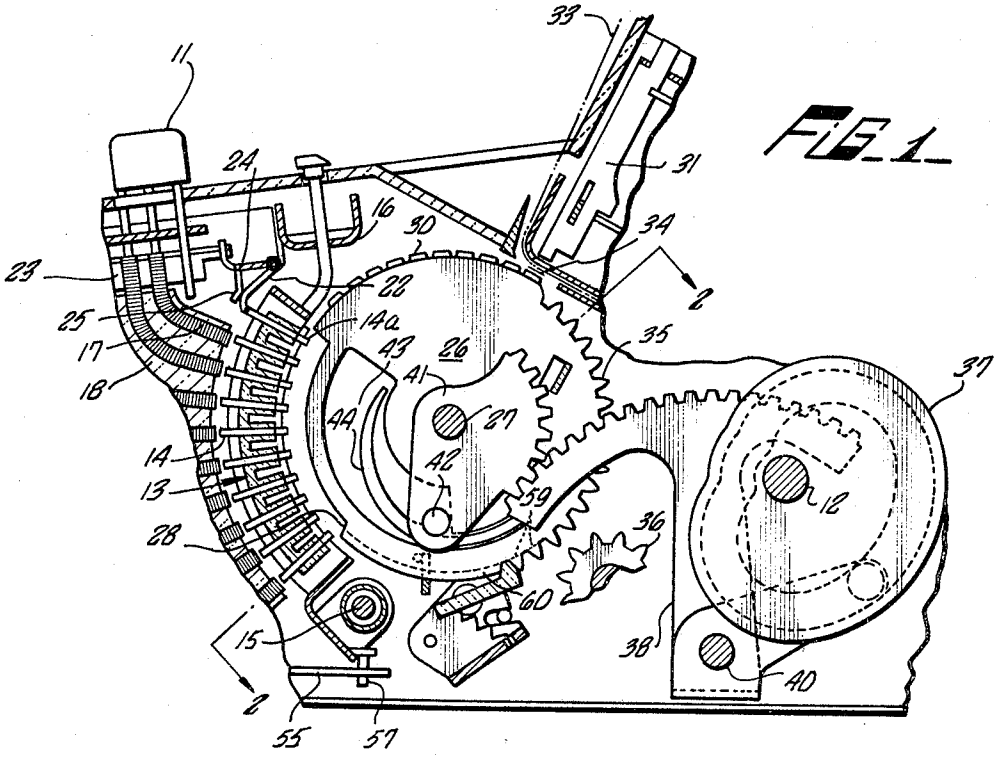


FIG. 1

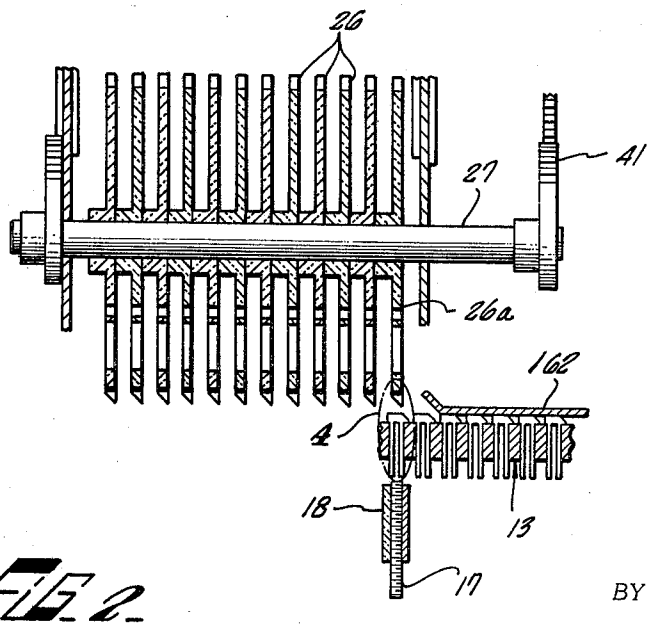


FIG. 2

INVENTOR.
JOHN G. CLARY
BY
Fred J. Schmidt

Dec. 2, 1969 J. G. CLARY 3,481,536

STOP PIN RETRACTING MEANS FOR TEN KEY CALCULATING MACHINE

Filed April 24, 1968 2 Sheets-Sheet 2

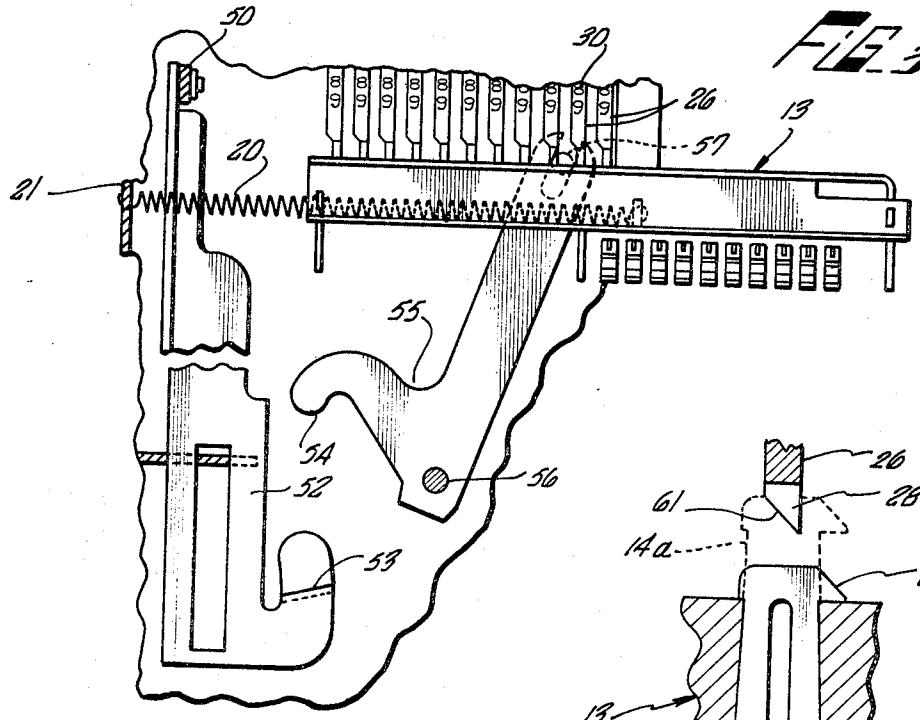


FIG. 3

FIG. 4

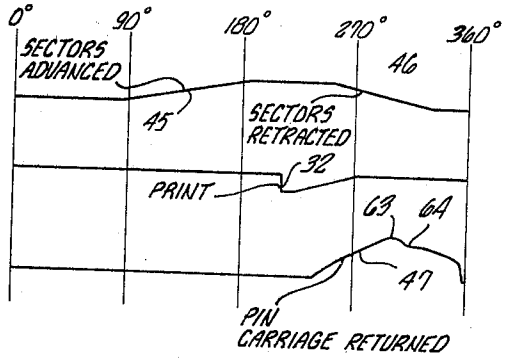


FIG. 6

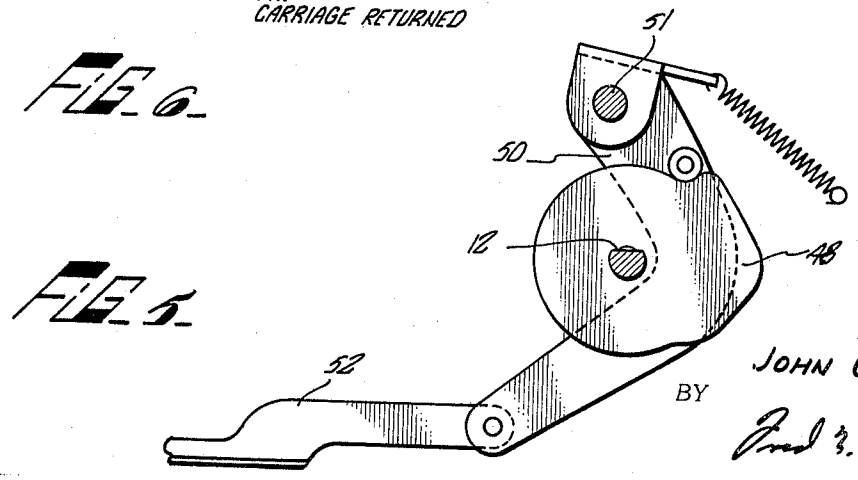


FIG. 5

INVENTOR
JOHN G. CLARY
BY
Fred G. Schaal

United States Patent Office 3,481,536
Patented Dec. 2, 1969

3,481,536

STOP PIN RETRACTING MEANS FOR TEN KEY CALCULATING MACHINE

John G. Clary, Pasadena, Calif., assignor to Addmaster Corporation, San Gabriel, Calif., a corporation of California

Filed Apr. 24, 1968, Ser. No. 723,777
Int. Cl. G06c 29/00
U.S. Cl. 235—60 3 Claims

ABSTRACT OF THE DISCLOSURE

A ten key type adding or calculating machine having a pin carriage containing settable stop pins and differential actuators controlled by the stop pins wherein the actuators and the stop pins have interengaging camming side edges capable of camming the stop pins from set positions during return of the pin carriage toward its normal home position.

This invention relates to cyclically operable calculating machines of the ten key type and has particular reference to means for retracting the stop pins of such machines from controlling positions to which they are set by the different amount keys.

In ten key type calculating machines, including adding machines, the differential actuators are generally advanced under control of a stop pin carriage which carries a field of stop pins. Normally, the actuators are retracted and as different amount keys are depressed to enter the digits of an amount, corresponding ones of the stop pins are set into actuator controlling or limiting position. As such stop pins are set, the carriage is stepped across the actuators from a home position to locate the set stop pins in the paths of stop shoulders formed on the actuators.

During a machine cycle, the actuators are yieldably advanced and are differentially arrested by the set stop pins. During the latter part of the cycle, the actuators are retracted. Because of the possibility of interference between the set stop pins and the actuators, the pin carriage must normally be held in advanced position until the actuators have been completely retracted, after which the pin carriage is returned to its home position and during that time the pins are retracted from set positions.

The pin carriage has an appreciable amount of mass and therefore a certain amount of time must be allowed to return the same to home position without undue acceleration and deceleration forces being developed, with attendant noise and jarring action. Such additional time prolongs the machine cycle and thus restricts the overall speed of the machine.

Attempts have been made heretofore to increase the cyclic speed of machines of the above type by overlapping the time of return of the stop pin carriage to home position with the time of return of the actuators. This has been accomplished by raising the actuators out of cooperation with the set stop pins of the pin carriage after advancement of such actuators as disclosed, for example, in the Halgren Patent 2,303,692 and in the Mark et al. Patent 2,989,231, or by lowering the pin carriage out of cooperative relation with the actuators as disclosed, for example, in the Maier Patent 2,708,550. Thus, the pin carriage can be returned to home position while the actuators are being returned from advanced positions. Such arrangements work satisfactorily, however, they involve extra mechanism necessary to move the actuators or the pin carriage into and out of cooperative relation with the other at proper times in the cycle.

Accordingly, a principal object of the present invention is to reduce the length of time required for a machine of the above type to progress through a machine cycle.

Another object is to provide a simple and yet reliable means for enabling a pin carriage to be returned to its home position during retraction of the actuators.

Another object is to enable one or more digits of a new amount to be entered into a ten key keyboard while the machine is performing a current calculation.

FIG. 1 is a sectional elevation view, with parts broken away, of a ten key adding machine embodying a preferred form of the present invention.

FIG. 2 is a transverse sectional view taken substantially along the line 2—2 of FIG. 1.

FIG. 3 is a sectional plan view through the machine, with parts broken away, illustrating part of the pin carriage return mechanism.

FIG. 4 is an enlarged fragmentary sectional view of that part encompassed by the circle 4 in FIG. 2.

FIG. 5 is a sectional elevation view of the cam drive for the pin carriage return mechanism.

FIG. 6 is a timing chart illustrating the relationship between the printing-actuator sector movement, printing operation and pin carriage return movement.

Describing the illustrated embodiment of the invention in detail, the machine in which the embodiment is disclosed is the well-known commercially available Addmaster adding machine whose various operating instrumentalities are basically disclosed in the R. E. Busch Patent No. 3,113,719 and the H. L. Clary et al. Patent No. 3,132,582. However, it is to be understood that the invention may be equally well applied to other types of ten key adding or other calculating machines.

The machine includes ten amount keys ranging in value from zero to nine, one of which is shown at **11**. The machine is motor driven through a cyclic clutch (not shown) whose driven side is operatively connected to a main drive shaft **12**. Suitable control keys (not shown) are also provided which when depressed, initiate operation of the clutch to cause a complete rotation of the shaft **12** in a clockwise direction. Such control keys also condition and control the machine to perform desired calculating operations.

An arcuate pin carriage **13** carrying a plurality of settable stop pins **14** is guided for movement transversely of the machine on a guide rod **15** and by a slotted frame member **16**.

The pins **14** are arranged in a plurality of horizontal rows and in a plurality of vertical columns, each column comprising ten such pins ranging in value from zero to nine.

Each of the ten amount keys **11** is suitably mounted for vertical movement and is connected to a respective flexible cable **17** guided for endwise movement in a guide block **18**. The cables **17** are located in a vertical plane which lies coincident with the lefthand row of stop pins **14** when the carriage is in its righthand home position shown in FIGS. 2 and 3.

The pin carriage is urged to the left by a tension spring **20** extending between the pin carriage and a part **21** of the machine frame. Normally, the pin carriage is held in its home position by the leftmost upper stop pin, i.e. **14***a*, which rests against the side of a fixed stop **22**. When any amount key, except the "9" key, is depressed, it operates through its respective cable **17** to set an aligned stop pin **14** from its full line position shown in FIGS. 1, 2 and 4 to its dotted line position **14***a*, and at the same time such key actuates a pivoted universal plate **23** which cooperates with a pivoted bail **24**. The latter has a foot **25** which is effective, when any key **11** is depressed, to set the aligned escapement pin **14***a* along with the correspondingly valued stop pin **14**. The "9" amount key is effective only to set the aligned escapement pin **14***a*.

Accordingly, as the leftmost escapement pin **14***a* is set, it moves below the stop **22**, permitting the carriage to advance leftward one denominational order to align the leftmost row of stop pins with a righthand actuator sector **26**.

A number of sectors **26** is provided equal to one more than the number of columns of stop pins **14** in the pin carriage and an additional symbol printing sector **26***a* is provided to the right of the sectors **26**. Such sectors are independently and rotatably mounted on a shaft **27** and as various amount keys are depressed, the pin carriage advances incrementally to the left to align additional rows of set stop pins **14** with the sectors. Each of the sectors **26** has a stop shoulder **28** formed thereon and adapted to limit against a set aligned one of the pins **14** during a machine cycle. Each sector also carries a series of type characters **30** ranging in value from zero to nine. The latter pass below aligned type hammers **31**.

During a printing phase of a machine cycle (as indicated at **32** in FIG. 6), the hammers **31** are spring-impelled downward to impact a paper strip **33** against a printing ribbon **34** and an underlying one of the type characters **30** so as to visibly record on the strip the amount set up through the various amount keys **11**.

Gear teeth **35** are formed on the sectors **26** to mesh with and drive denominationally arranged gear elements **36** of an accumulator.

Shortly after the start of a machine cycle, the sectors **26** are yieldably advanced clockwise until their shoulders limit against set aligned ones of the stop pins **14**. For this purpose, a cam **37** is mounted on the shaft **12** and operates against a combined cam follower and gear sector **38** pivotally supported at **40** to oscillate a gear sector **41** fixed on the shaft **27** and carrying a bail rod **42**. The latter extends through openings **43** in the sectors **26** and is yieldably coupled to spring tails **44** formed integral with the sectors. Thus, during a sector advancing phase **45** (FIG. 6) of the cycle, the sectors are yieldably advanced clockwise until their shoulders **28** limit against set ones of the stop pins. After printing, and during a sector retracting phase **46** of the cycle, the sectors are returned counterclockwise to their illustrated home positions.

Means are provided for returning the pin carriage to its righthand home position during a pin carriage return phase **47** of a machine cycle, which phase at least partly overlaps the sector retracting phase **46**. For this purpose, a cam **48** on the drive shaft **12** coacts with a cam follower **50** fulcrummed at **51** to drive a pin carriage return link **52** rearwardly. The latter has a depending ear **53** which is engageable with a nose **54** formed on a bellcrank **55**. The bellcrank fulcrummed at **56** and is connected through a pin-and-slot coupling **57** with the pin carriage **13** so that as the bellcrank **55** is rocked clockwise by the link **52**, the carriage will be returned to the right.

According to the present invention, each printing-actuator sector **26** has a trailing section **60** concentric with the axis of shaft **27** and terminating at the shoulder **28**. Such trailing section is chamfered at substantially 45 degrees along its lefthand edge, as indicated at **61**, FIG. 4, throughout its length. Also, two of the adjacent gear teeth **35** are likewise chamfered as indicated at **59**. Such chamfered edge forms a camming surface arranged to engage a complementarily chamfered edge **62** formed on the stop pins **14** during return of the pin carriage toward its righthand home position. Thus, during return of the pin carriage, which occurs before and during part of the retraction of the sectors, certain of the set stop pins may engage the sides of one or more of the sectors and, in

that case, such pins will be cammed outward sufficiently to pass under the sectors. The symbol sector **26***a* is controlled by means (not shown) other than set ones of the stop pins but it also has a chamfered edge on part of its periphery effective to cam a set stop pin outward as the latter strikes the same during return of the pin carriage.

In those cases where a stop pin is not partially retracted by a sector, it is fully cammed into retracted position by a stationary cam member **162** (FIG. 2) which is suitably supported by the machine frame. The cam member **162** is also effective to fully retract those pins which were partially retracted by one of the sectors.

It should be noted that the pin carriage return mechanism of FIGS. 3 and 5 imparts sufficient rightward movement to the pin carriage to carry the lefthand column of pins **14** under the camming member **162** and to thereafter allow the pin carriage to move back to its illustrated home position. Thus, the pins will be completely restored at point **63** in the cycle (FIG. 6) and the pin carriage will be returned to its home position at point **64**, permitting one or more amount keys to be depressed to enter one or more digits of a new calculation before the completion of a current cycle.

Having thus described the invention, what is desired to be secured by United States Letters Patent is:

1. A calculating machine comprising denominationally arranged actuators differentially and independently advanceable in a first direction.

each said actuator having a stop shoulder thereon,

means for yieldably advancing said actuators in said first direction and for thereafter returning said actuators in the opposite direction,

a stop pin carriage,

stop pins carried by said carriage,

means supporting said carriage for movement across said actuators,

means for moving selected ones of said pins to set positions and for advancing said carriage from a home position to locate said set pins in the paths of certain of said stop shoulders, and

means for returning said carriage to said home position prior to return of said actuators,

said actuators and said pins having cooperating surfaces effective to cam set ones of said pins from said set positions during movement of said carriage toward said home position.

2. A calculating machine according to claim **1** wherein said cooperating surfaces comprise interengaging camsurfaces.

3. A calculating machine according to claim **1** wherein said actuators have sections thereon located rearwardly of said stop shoulders,

said sections having camming surfaces thereon engageable with set ones of said pins to cam said set pins from set positions.

References Cited

UNITED STATES PATENTS

2,088,397	7/1937	Bilde	235—60
2,677,498	5/1954	Parker	235—60
2,823,854	2/1958	Walther	235—60
3,053,442	9/1962	Bacher	235—60
3,095,143	6/1963	Oldenburg et al.	235—60

RICHARD B. WILKINSON, Primary Examiner

S. A. WAL, Assistant Examiner