

Feb. 21, 1939.

L. P. CROSMAN

2,147,692

LISTING CALCULATOR

Filed March 9, 1935

6 Sheets-Sheet 1

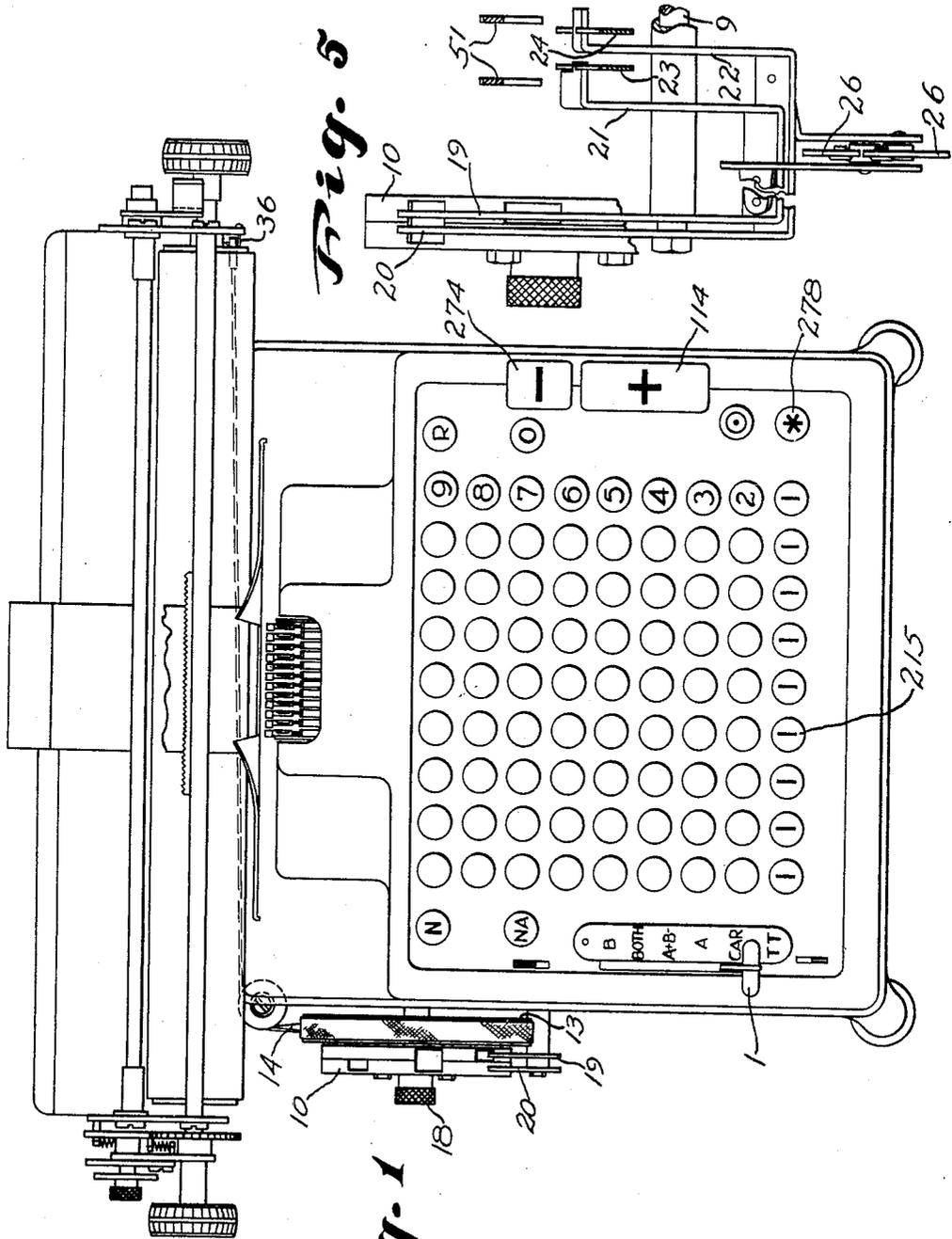


Fig. 5

Fig. 1

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LISTING CALCULATOR

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6 Sheets-Sheet 2

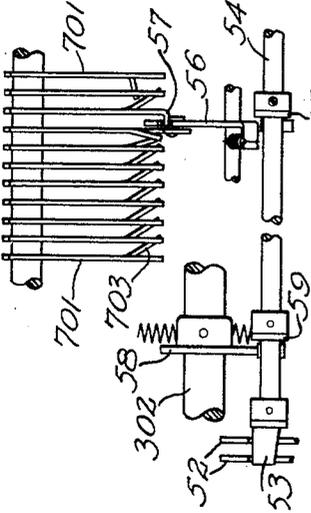
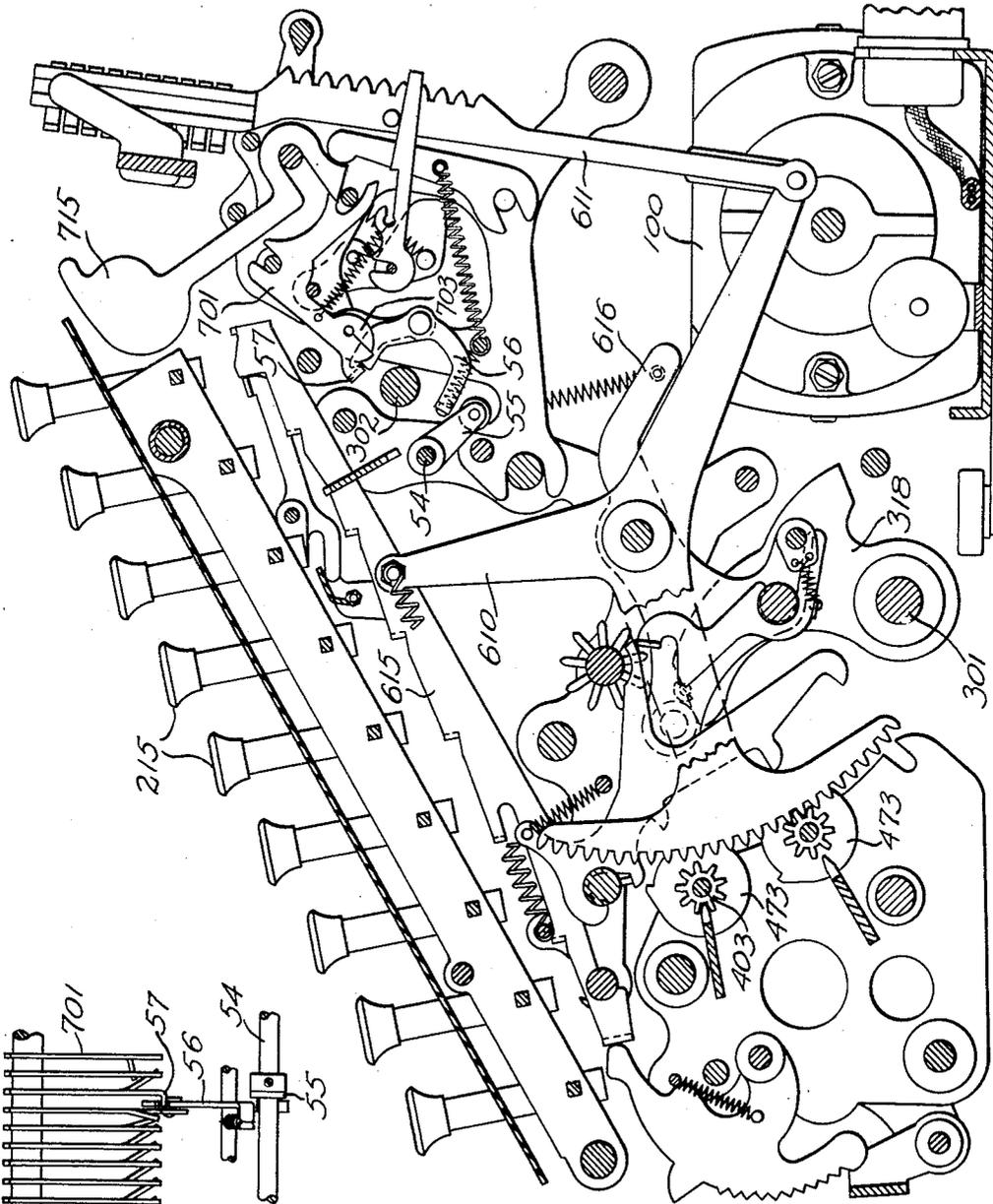


Fig. 12

Fig. 2

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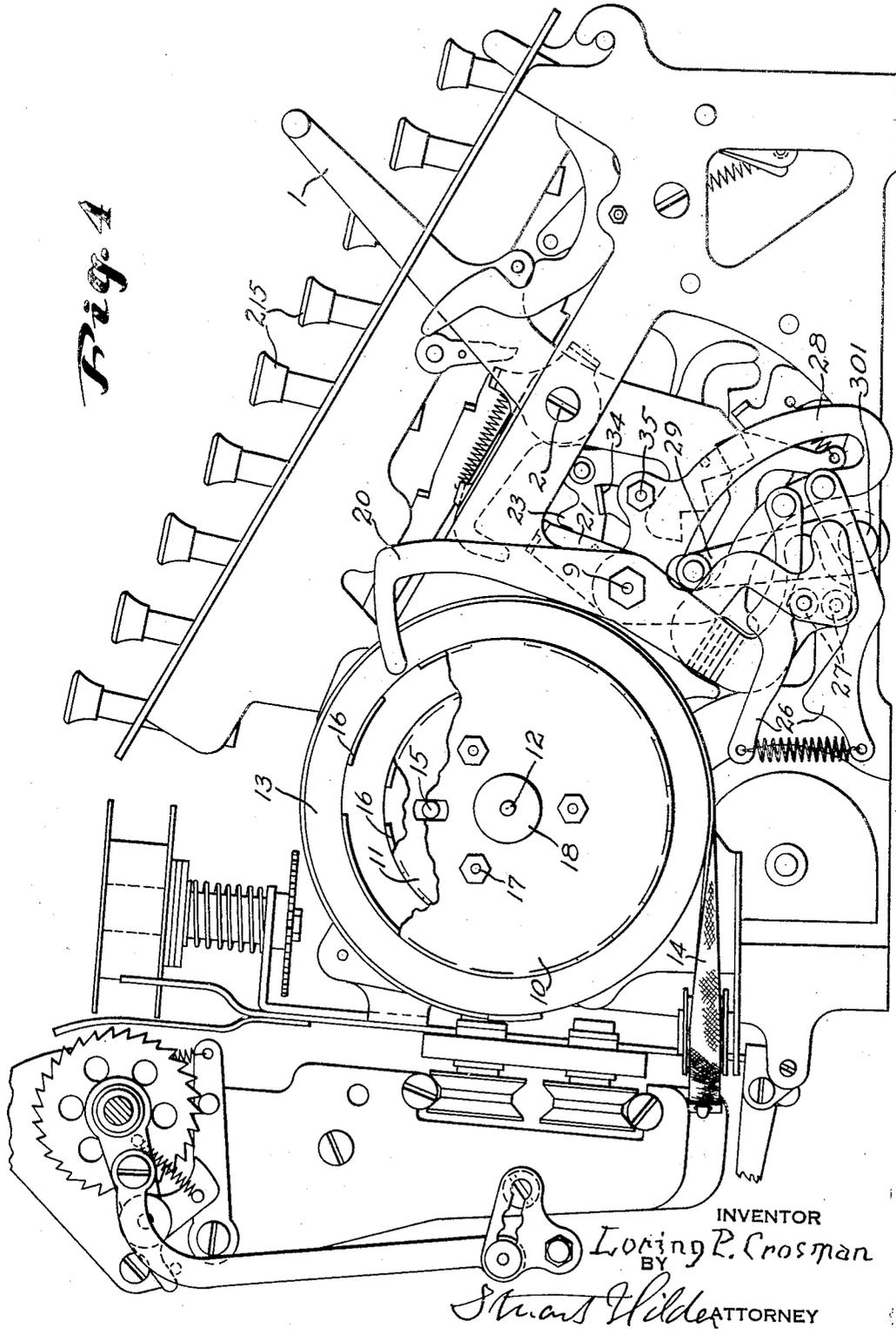
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LISTING CALCULATOR

Filed March 9, 1935

6 Sheets-Sheet 4



Feb. 21, 1939.

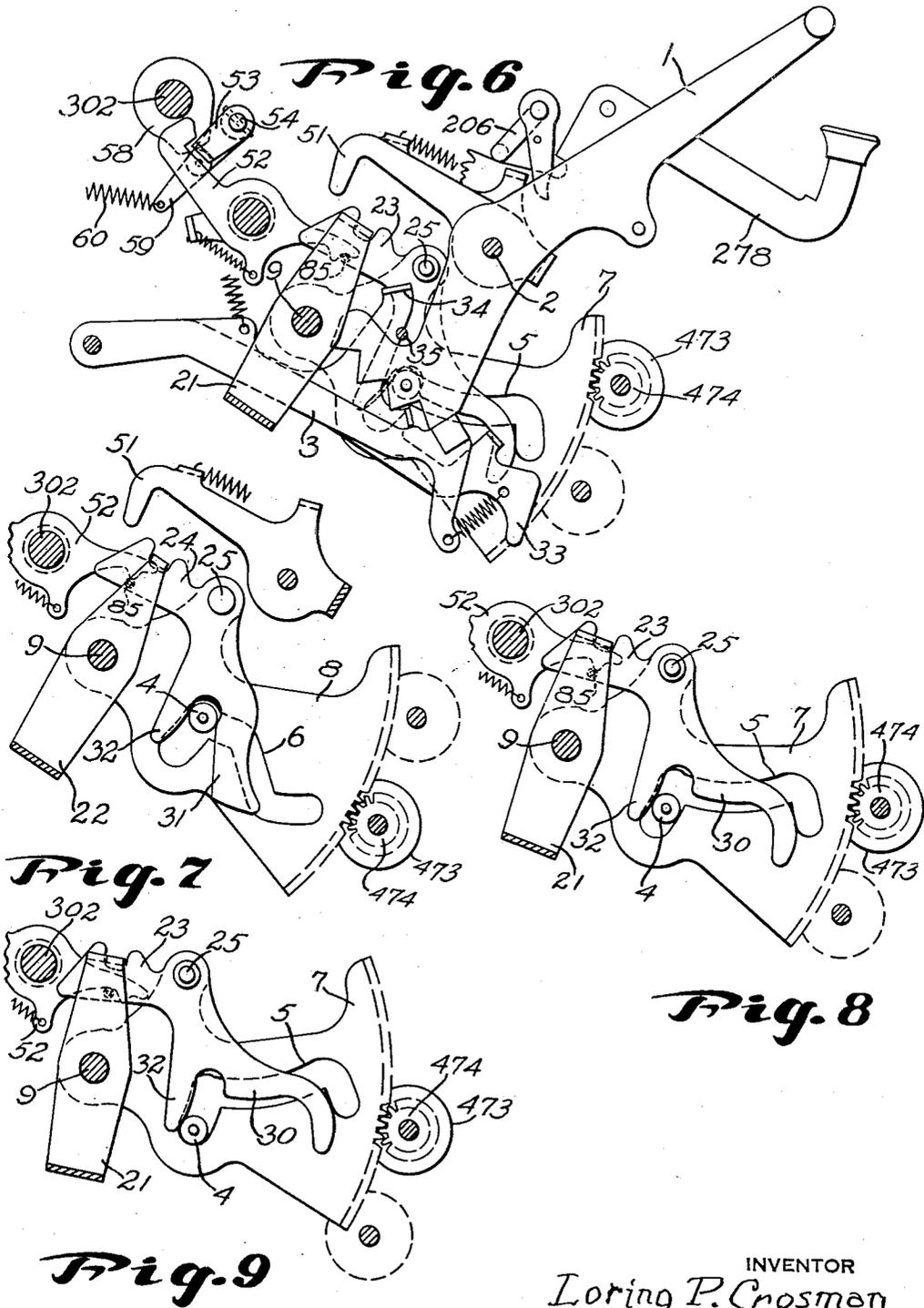
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LISTING CALCULATOR

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6 Sheets-Sheet 5



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2,147,692

LISTING CALCULATOR

Filed March 9, 1935

6 Sheets--Sheet 6

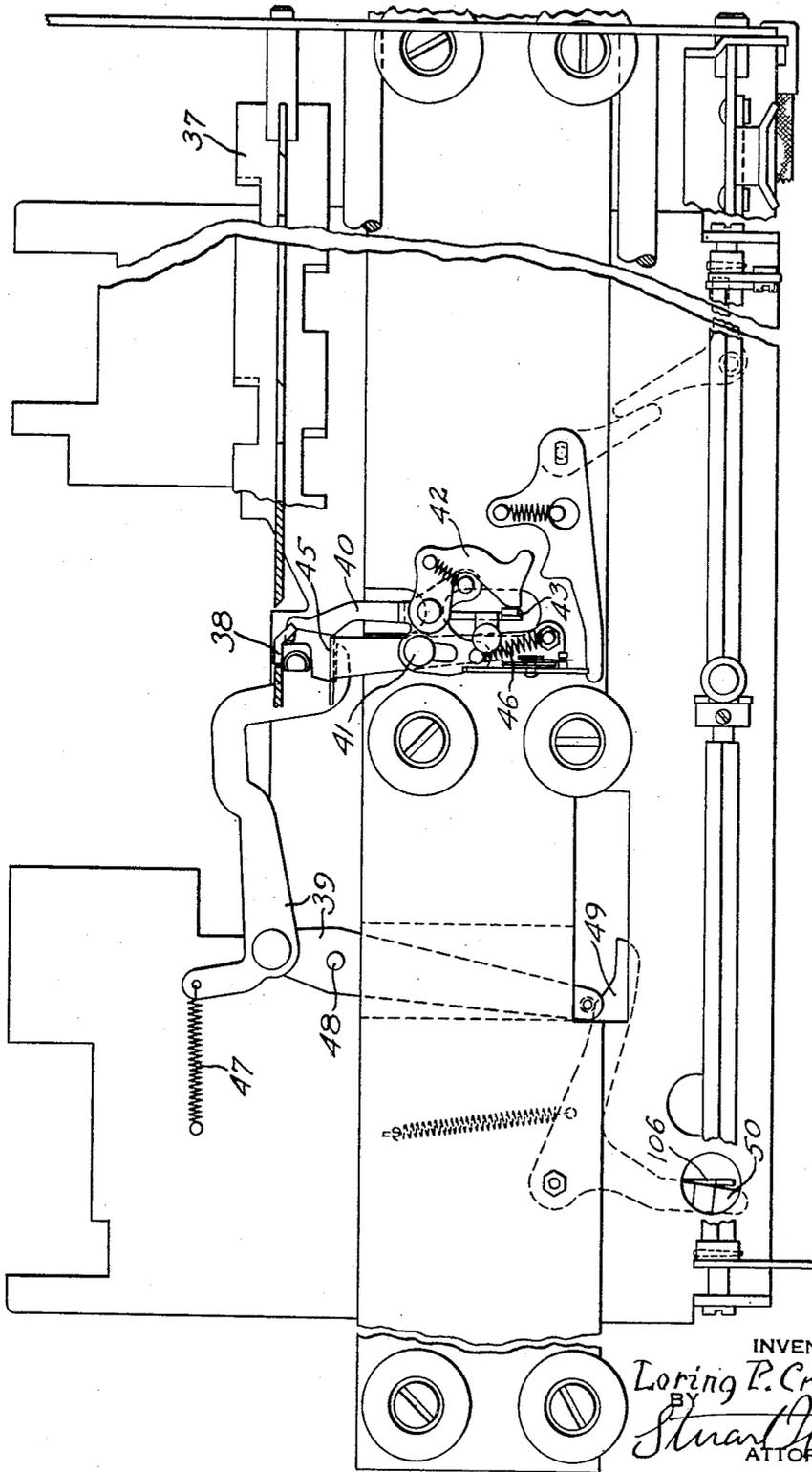


Fig. 10

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UNITED STATES PATENT OFFICE

2,147,692

LISTING CALCULATOR

Loring Pickering Crosman, Maplewood, N. J., assignor, by mesne assignments, to Monroe Calculating Machine Company, Orange, N. J., a corporation of Delaware

Application March 9, 1935, Serial No. 10,270

7 Claims. (Cl. 235-60)

The invention has relation to listing calculators and more particularly to programme mechanism, whereby such a machine may be set automatically to perform a succession of different operations, in given sequence.

The invention contemplates the provision of improved means for selecting the desired accumulators to be operated and/or for selecting the character of the operation to be performed thereon, in each of several columnar positions of a transversely shiftable record carriage. A principal object of the invention is a provision of power means for making such selections during the registering cycle of the machine. Other objects of the invention will hereinafter appear.

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

The invention is shown as applied to a listing calculator of the well known Gardner construction, illustrated in U. S. Patent 1,867,002, issued July 12, 1932 to Clyde Gardner, deceased; as modified by the disclosure of U. S. Patent 1,932,013, issued October 20, 1933 to Loring P. Crosman. The invention constitutes an improvement of the programme mechanism illustrated in U. S. Patent 1,946,572, issued February 13, 1934 to Loring P. Crosman.

In the accompanying drawings illustrating the invention:

Fig. 1 is a plan view of a listing calculator embodying the invention.

Fig. 2 is a vertical section through the keyboard, accumulator and printing mechanism.

Fig. 3 is a right side elevation of parts immediately within the casing of the machine.

Fig. 4 is a left side elevation of the machine with the casing removed.

Fig. 5 is a detail front view of the feelers and associated parts.

Fig. 6 is a detail left side elevation of the accumulator setting segments and associated parts, in position for setting the upper accumulator for addition.

Fig. 7 is a similar view, showing the parts in position for setting the lower accumulator in non-add position.

Fig. 8 is a similar view, with parts in position for setting the upper accumulator in non-add position.

Fig. 9 is a similar view, with parts in position for setting the upper accumulator in subtract position.

Fig. 10 is a rear elevation of the tabulating means for the record carriage.

Fig. 11 is a detail side elevation of parts removed from Fig. 3.

Fig. 12 is a detail plan view of the non-add splitting mechanism.

In the machine illustrated, amounts set up on the digit keyboard 215 (Figs. 1 and 2) are accumulated in one or in both accumulators 473, either additively by engagement of an accumulator during the upward stroke or subtractively by engagement thereof during the downward stroke of reciprocatory actuating segments 610. The segments are reciprocated by movement of a rock shaft 301, preferably driven by electric motor 100, said rock shaft having a cam 318, adapted to move a rocking frame 616, and thereby cooperating with the springs of the segments to effect movement thereof. The extent of movement of each segment is limited by engagement of a stop bar 615 carried by the segment, with the lower end of a depressed key 215, whereby this extent of movement will correspond to the value of such depressed key. Type bars 611 are connected with the segments 610, and are raised thereby to bring the appropriate type to the printing line. Before the return of the adjusted segments by the frame 616, spring type hammers 715 will be released by triggers 701, to print the item on a record sheet.

Plus, minus and non-add setting

The accumulators 473 are set to give the desired registration by means of two cam plates 419, 421 (Fig. 3) pivoted in the frame at 420 and 422, respectively, these plates cooperating with cams carried on the shafts 403 of the accumulators. From the position illustrated in Fig. 3, the cam plates 419, 421 are rocked toward each other by means of a rocker device 325, connected with the cam plates by members 322, 321, and operated by cam arms 320, 316, fixed upon the rock shaft 301. Rocker device 325, as set for normal operation, provides for movement of plates 419, 421 toward each other, as soon as the machine is put in operation, and before the movement of segments 610. At the beginning of the return movement of shaft 301, rocker 325 will be operated in a reverse direction, to return the cam plates 419, 421 to the position illustrated in Fig. 3 before the return movement of segments 610 is begun. Each of the cam plates 419, 421 is provided with two cam faces, 452, 454, these cam faces being offset from each other transversely, and lying in different circumferential angular positions. In the position illustrated in Fig. 3, the cam faces 452 of the plates are opposite the shafts 403,

whereas, upon movement of the plates by rocker 325, the cam faces 454 thereof will be brought opposite the shafts 403.

Each shaft 403 is provided with a cam 453, lying in the plane of the related cam face 452, and a cam 455, lying in the plane of the related cam face 454. The shafts 403 may be held in either of three rotated positions, whereby the high points of cams 453 or 455, or the low points of both cams may be brought opposite the cam faces of the plates 419, 421.

The shafts 403 are urged by spring means (not shown) away from the segments 610, suitable guides in the frame of the machine being engaged by said shafts. Thus, the shafts 403 will hold the accumulators 473 out of mesh with the segments 610 unless a cam face 452 or 454 is engaged by a cam 453 or 455, in which case the accumulator will be thrown into mesh with the segments.

It will be seen that the low point position of the cams 453, 455 provide a non-add adjustment for the accumulator 473. To set the accumulators for addition, the cams 453 are rotated to active position in which the accumulators will stand in engagement with the segments 610 when the machine is at rest; will be allowed to drop out of mesh with the segments as soon as the machine is put in operation and will be reengaged with the segments at the beginning of the return stroke thereof. It may be noted that the upper accumulator is set for addition in Fig. 3, the lower accumulator being set for non-add. To set the accumulators for subtraction, the cams 455 are rotated into the path of movement of the cam faces 454. When the machine is started, the rocking of plates 419, 421 will bring the cam faces 454 in contact with the cams 455, and will move the accumulators 473 into mesh with the segments before said segments are released by the frame 616. Before the return movement of the segments has started, the plates 419, 421 will again be rocked, moving the cam faces 454 away from cams 455 and allowing the accumulators to move out of mesh with said segment.

All of the above-noted operations relate to normal registration, which is effected by depression of a normal operation key 114, which releases a latch 113 from engagement with a spring impelled clutch control lever 106. The effect of the additive or subtractive settings of the cams 453, 455 may be reversed, by depression of a reverse operation key 274 acting to trip the latch 113 and to adjust the rocker device 325, as set forth in Patent 1,932,013, hereinbefore referred to. The settings are similarly reversed upon operation of the total key 278 (Figs. 1 and 6). This reversing adjustment of the rocker 325 provides that the plates 419, 421 shall remain in the position illustrated in Fig. 3 until the completion of the downward stroke of the segment 610 whereupon said plates will be rocked toward each other, and held in this adjusted position during the return stroke of the segments.

All of the above mechanism is substantially like that shown in Patents 1,867,002 and 1,932,013 hereinbefore referred to.

Control lever

Two means are provided for rotating the shafts 403 and thereby setting the accumulators 473 for the desired registration, one of these means providing for a manual setting of the accumulators and the other for an automatic setting thereof

by means controlled by the position of the record carriage.

The first named means comprises a control lever 1, (Figs. 1, 4 and 6) fulcrumed in the frame at 2 and held by spring click 3 in either of five adjusted positions. These positions are indicated on the display plate illustrated in Fig. 1 by the letters "B", "Both", "A+B-", "A", "Car". It may be noted that the designation "TT" on the display plate does not relate to the control lever 1 and is of no interest in the present specification.

Fixed on the lever 1 are a pair of anti-friction rollers 4, working in cam slots 5 and 6 of a pair of segments 7 and 8, supported on a shaft 9. Segment 7 meshes with a pinion 474 which has universal joint drive connection (not shown) with the shaft 403 of the upper accumulator 473. Similarly, segment 8 meshes with a pinion 474 related to the lower accumulator 473.

With the lever 1 in its forward position, marked "Car" in Fig. 1, free movement is allowed of the segments 7 and 8, so that said segments may be set by the programme mechanism hereinafter described. With the machine at rest and lever 1 so adjusted, the rollers 4 will be positioned in the tops of the arcuate portions of slots 5 and 6 (as shown in Figs. 6 and 7), and movement of lever 1 from "Car" to "A" position will bring rollers 4 into the radial portions of said slots, without imparting movement to the segments 7 and 8. In these two positions of the parts, the upper or "A" accumulator will be set for addition and the lower or "B" accumulator for non-add, as shown in Fig. 3. The next step of movement of lever 1, to "A+B-" position will not result in the movement of the segment 7 related to the "A" accumulator, the related portion of the slot 5 providing for no camming action. "B" accumulator, however, is to be given one step of movement, by clockwise rotation of pinion 474, as viewed in Fig. 7, this movement being counter-clockwise as shown in Fig. 3 (cam 455). In this adjustment, the roller 4 will lie half way down the cam portion of slot 6. At the position "Both", "A" accumulator is still maintained in addition position and "B" accumulator given a second step of adjustment, into add position, roller 4 lying at the bottom of the cam portion of slot 6. The last step of adjustment of lever 1, into "B" position leaves accumulator "B" in add position and gives a step of adjustment to accumulator "A", the roller 4 contacting with the cam wall at the extreme end of slot 5 to effect this adjustment.

Programme mechanism

For controlling the setting of the accumulators automatically, in accordance with the position of the record carriage, concentrically flanged disks 10 and 11 (Figs. 1 and 4) are mounted on the stud 12 supporting the spring drum 13 which carries the carriage shifting tape 14, these disks being rotated with the drum by means of a pin and slot connection 15.

For convenience, each disk may be made in two parts and assembled with the flanges 16 thereof extending toward each other, to form a pair of hollow cylinders secured in a single unit by means of bolts 17. Thus, the entire cylinder unit is slipped upon shafts 12 and secured by a nut 18. The flanges 16 of each disk are cut away at intervals to form perforations in the drums which may be entered by feelers 19 and 20, there being in effect two series of such perforations as will be obvious from an inspection of Fig. 1. The feelers 19 and 20 are loosely

mounted on the shaft 9, and are of U shape formation, as seen in Fig. 5, having inner arms 21, 22 (Figs. 6 to 9) provided with angularly bent ends adapted to engage in notched seats of a pair of pawls 23, 24, pivoted at 25 upon the segments 7 and 8, respectively.

The feelers 19 and 20 are yieldably connected by means of spring pressed, notched arms 26 and anti-friction rollers 27 (Fig. 4) mounted on extensions of said feelers, with a cam plate 28 pivoted upon the shaft 9 and engaged by a roller carried at the end of an arm 29, secured to the rock shaft 301. The cam slot of plate 28 is so designed that the initial forward movement of shaft 301 will rock the plate and through the yieldable connections 26 will rock the feelers 19 and 20 about shaft 9, bringing the free ends of such feelers toward the center of the disks 10, 11.

When a flange 16 of a disk 10 lies opposite either one of the feelers, no appreciable movement of said feeler is allowed and the related segment 7 or 8 will be held in its normal "Car" position. If the flange 16 is cut away opposite one of the feelers, said feeler will be drawn by movement of the plate 28 through the opening in the outer cylinder and, should a flange 16 of the inner cylinder be in its path, it will come to rest in a second position, in which the segment 7 or 8 will be raised and the accumulator shaft 403 rotated approximately a third of a rotation. This position of the arm 21 of feeler 19 is illustrated in Fig. 8, the segment 7 having been raised and the pinion 474 rotated to set the upper or "A" accumulator into its second position. Should the flanges 16 of both cylinders be cut away opposite a feeler, the feeler will be drawn to its third or extreme position by the plate 28. The third position setting of the segment 7 related to the "A" accumulator is illustrated in Fig. 9.

Thus, upon reciprocation of shaft 301, the feelers 19 and 20 will be carried toward the disks 10 and 11, until stopped by the flange 16, or by reaching the limit of their movement. Upon encountering the flange 16, the connection 26, 27 will yield, and the feeler will be left in arrested position until the return movement of shaft 301, when the notch of the spring pressed arm 26 will engage the roller 27 and carry the feeler back to its normal position.

By reference to the preceding description, it will be obvious that the three positions of the feelers will adjust the accumulators "A" and "B" as follows:

	"A" accumulator	"B" accumulator
1st feeler position.....	+	0
2nd feeler position.....	0	-
3rd feeler position.....	-	+

When the control lever 1 is moved out of its "Car" position, the segments 7 and 8 are disengaged from the feelers 19 and 20 by contact of the rollers 4 with cam extensions 30, 31 of the pawls 23, 24 (Figs. 7 and 8), rotating said pawls to move their notched seats away from the angularly bent ends of the arms 21, 22, as seen in Fig. 4. Upon return of control lever 1 to its "Car" position, the pawls 30, 31 will be rocked into their first described position by contact of the related roller 4 with an extension 32 of the pawl.

In order that the spring click 3 may not be left in a point to point contact with the teeth of said

lever, an auxiliary locating lever 33 is provided (Fig. 6), normally movable with the click 3 by means of a spring and stop connection, said lever 33 being provided with a lug 34 lying in the path of movement of a pin 35 secured in the plate 28 (Fig. 4). Upon movement of plate 28 by shaft 301, pin 35 will be carried against lug 34 and in case of a point to point contact of click 3 and lever 1 suitable lugs of the lever 33 will engage the locator teeth of lever 1 and will force the same into a fully adjusted position.

Tabulation

The tape 14 is secured to the frame of the record carriage at 36, whereby the drum 13 will move the carriage to the left, from column to column of the work sheet, as governed by a tabulator device.

This device comprises a tabular bar 37 (Fig. 10) mounted in the carriage and having a notched flange adapted to engage with the detent lug 38 of a compound lever 39. As shown, the bar 37 has a plurality of flanges, differing from each other in the spacing of the notches, so that work of different sorts and record sheets with differently spaced columns may be accommodated. Bar 37 is rotatably mounted in the carriage, and may be fixed in any one of several rotated positions, to bring the appropriate flange into position to cooperate with the detent lug 38. Upon changing the adjustment of the bar 37 to bring a new notched flange into operative position, the disk assembly 10, 11 should be removed, and a new disk assembly inserted in its place, in order that the disks may be properly located by the tabulator device.

The carriage is released to effect the tabulating movement by means of a spring pawl 40 (Fig. 10) having a hook end adapted to engage over the detent lug 38. Pawl 40 has pivotal and sliding movement about a stud 41, fixed in the machine frame, and normally lies in the retracted position illustrated in Fig. 10. During the operation of the machine, pawl 40 is raised to bring its hook end over the lug 38, by engagement of a spring latch 42, pivoted upon the pawl 40 with one arm of a bell crank lever 43, fulcrumed at 44 in the frame of the machine, as seen in Fig. 3. The other arm of bell crank lever 43 is engaged by a pin carried on a spring arm 45 (Figs. 3 and 11) engaging a plate 46 pivotally mounted upon a rock shaft 302, and connected to said shaft by a crank pin and lost motion slot. Shaft 302 is connected to rock shaft 301 by members 327, 324 and cam arm 316.

Upon rocking of shaft 301, shaft 302 will also be rocked and plate 46 will fall away from the roller of arm 45, allowing said arm to rock the bell crank lever 43. The rearward arm of bell crank lever 43 will thus be brought below the spring latch 42, which latch will move into position above said arm. Upon reverse movement of shafts 301 and 302, rearward arm of bell crank lever 43 will be rocked upwardly, carrying latch 42 and pawl 40 therewith, whereupon the hook end of pawl 40 will snap into position above lug 38, since the projecting portion of pawl 40 will be moved out of contact with a guide surface 45 of the frame. The rocking movement of pawl 40 about stud 41 will bring a pin of said pawl into contact with the latch 42 and will move said latch away from the bell crank lever 43, whereupon the spring 46 will move pawl 40 downwardly, thereby rocking the upper arm of lever 39 and disengaging detent lug 38 from the flange of bar 37.

Further downward movement of pawl 40 will

bring the tooth portion thereof against the guide 45 and will move the hook end of said pawl out of contact with lug 38.

The carriage, thus freed, will move to the left (to the right as seen in Fig. 10), the lug 38, upon release of the hook end of the pawl 40, being held by a spring 47 in contact with the lower face of the flange of bar 37, so that it will move up into the next notch of the flange as the carriage reaches the next tabular position. Spring 47 also serves to retract lever 39 and thereby shift the lug 38 beneath the flange of bar 37, as soon as said lug is freed from the flange, so that the more sluggish movement of the carriage is not relied upon to prevent reengagement of said lug with the same notch of the bar. This release of the carriage occurs during the latter part of the return stroke of the segments 610, and is effective after the return of the feelers 19, 20.

When the lug 38 is engaged by the flange of bar 37, the compound lever 39 will be moved slightly about its fulcrum 48, this movement being utilized to release an interlock, preventing movement of the clutch control lever 106 into clutch releasing position, so that the depression of a motor key will not start a new operation of the machine until the carriage has been located in its new position. This interlock is effected by a pivoted member 49, having a cam arm adjusted by the compound lever 39 and an extension 50, movable by said lever into the path of movement of the clutch control lever 106 (Figs. 3 and 10).

Selection of accumulator in total printing

During non-programme calculation, when it is desired to print the total registered in one of the accumulators, the control lever 1 is set into "A" or "B" position, and the total key 278 is depressed. The control lever will select the register from which the total is to be taken, and the parts controlled by the total key 278 will operate precisely the same in taking a total from "A" or from "B" accumulator. In the machine illustrated the accumulator to be totalized will be rotated to zero registering position and the type bars 611 appropriately positioned by spring means, after which the clutch will be engaged and a cycle of machine operation effected to print the total and restore the parts to normal position.

Therefore, when operating the machine under control of the programme mechanism the movement of the feeler levers will occur too late to provide for the selection of the accumulator to be totalized. In other words, the preliminary rotation of the accumulator to zero must be in accordance with the controls which are active when the feelers are in their first position. This position, as above stated, will provide normally (when the machine is set for programme operation) for plus registration on "A" accumulator and for non-add in regard to "B" accumulator, but owing to the reversal of the setting of rocker 325 by the total key, the following cycle of machine operation above referred to will be subtractive with relation to "A" accumulator.

In order, therefore, that the accumulators may not be adjusted by the programme mechanism for operation according to an inconsistent sign when a total is taken, irrespective of the position of the record carriage, means are provided whereby the depression of the total key 278 will limit the movement of the accumulator setting segments 7 and 8. As shown this will include the locking of segment 7 in lower position, providing a selection of "A" accumulator to be rotated to

zero, and it may also include the locking of segment 8 out of its highest position only, since the intermediate position provides an adjustment of "B" accumulator into its normal subtractive position, in order that the total taken from accumulator "A" may be added into or transferred to accumulator "B", which will thus serve as a grand total accumulator.

For this purpose an arm fixed upon a crank rod 206 (Fig. 6) rocked by the total key 278 upon depression thereof, will contact with and adjust a U shaped stop dog 51, provided with two hook ends (Figs. 6 and 7), bringing these hook ends into the path of movement of the arms 21, 22 of the feelers. The hook end cooperating with arm 21 moves substantially into engagement with said arm as it rests in normal position, while the hook end cooperating with arm 22 moves to position sufficiently in front of said arm to allow feeler 20 to move into its second position. The total key 278 is held in depressed position until the end of the cycle of total printing operation, whereupon it is restored to normal position and the dog 51 will be released, when the pressure of the arm on rod 206 is allowed to return to normal disengaged position under the influence of a suitable spring.

Split printing

In printing values on the record sheet the zeros appearing to the right of values set on the keyboard will be printed, owing to the provision of offset lugs 703 of the triggers 701, so that the triggers overlap each other from right to left, and the displacement of a higher order trigger will likewise displace all the lower order triggers. Non-add operations of the machine are principally for the purpose of printing nonvalue figures on the record sheet and it is desirable in such printing to prevent action of the triggers 701 in the two right hand columns, which lie below the decimal point in value printing, whereby the printing of the decimal point will be avoided. In order to effect this splitting of the printing members when both of the accumulators are adjusted to non-add position by the feelers 19 and 20, a pair of latches 52 are provided (Figs. 6-9) normally engaging an arm 53 secured upon a rock shaft 54, said latches also being provided with toothed arms engaging pins 85 secured in the pawls 23 and 24. Rock shaft 54 is provided with an arm 55 (Figs. 2 and 12) engageable with one arm of a latch 56 forming a special connection between the trigger of the decimal point printing hammer 715 and the next higher order trigger. In the normal position of the parts, latch 56 which is secured upon said higher order trigger underlies a laterally bent lug 57 of the decimal point trigger, to operate the latter in the same manner as the lug 703 of the other triggers. When shaft 54 is rocked counterclockwise as seen in Fig. 2, latch 56 will be displaced from beneath lug 57, so that tripping of the higher order triggers will not trip the triggers below the decimal point. (In Fig. 12 the right hand trigger 701 is not related to value type, but to type for printing various symbols.)

Therefore, upon movement of feeler 19 into its second position and upon maintenance of feeler 20 in its first position, both latches 52 will be removed from the path of arm 53. Thereafter, upon rocking movement of shaft 302, a cam 58 mounted upon said shaft will move away from a roller mounted on an arm 59 of rock shaft 54, allowing said shaft to be pulled by spring 60 into 75

operative position to effect the splitting. At the end of the operation, cam 58 will rock shaft 54 reversely and a suitable spring will move latch 56 back into engagement beneath lug 57.

Operation

When the machine is to be operated under control of the programme mechanism, the control lever 1 is set into "Car" position, the record sheet inserted in the carriage, and an item set up on the keys 215 and the normal operation key 114 is depressed. Depression of key 114 engages the clutch and puts rock shaft 301 in motion, whereupon, as a first step, cam arm 320, through the rocker 325 adjusts the cam plates 419, 421, and simultaneously the plate 28 is rocked by arm 29 on shaft 301 and the feelers 19, 20 are moved as far toward the center of disks 10, 11 as is permitted by the flanges 16, thereby adjusting the cams 453, 455 of the two accumulators, to secure the desired operation. Further rocking movement of shaft 301 will allow the segments 610 to move downward, giving a subtractive operation in any accumulator which may be in engagement with such segments. The hammers 715 are now tripped, printing the item on the work sheet, after which the segments 610 are raised, effecting an additive registration upon any accumulator 473 which may be in mesh at such time. Near the end of the reverse movement of shaft 301, detent lug 38 is moved out of contact with the notched flange of tabulator bar 37, and the carriage is moved toward the left, into the next column in which an entry is to be made, by means of the spring drum 13, this movement also setting up the programme mechanism for the succeeding operation. Finally, the clutch is disengaged, this clutch being of the well known type providing for an automatic disengagement after a single cycle of operation. The parts are now again in normal position, ready for the entry of a second item or the taking of a total.

I claim:

1. In a listing calculator, the combination with a transversely shiftable record carriage, an accumulator, and means for effecting and recording a registration; of carriage shifting means including a spring drum, differentially settable means for determining the character of the registration, and setting means including a circumferentially graded element mounted upon said spring drum, and a cooperating feeler element connected with the determining means.

2. In a listing calculator, the combination with a transversely shiftable record carriage, an accumulator, and means for effecting and recording a registration; of differentially settable means for determining the character of the registration, and setting means including a rotary element having a series of concentric, partially cut away cylindrical flanges, connections operable through the transversely shiftable record carriage to rotate said element, and a feeler element cooperating with the cylindrical flanges and connected with the determining means.

3. In a listing calculator, the combination with a transversely shiftable record carriage, an accumulator, and cyclically operated means for effecting and recording a registration; of differentially settable means for determining the character of the registration, setting means including a graded element adjustable through the transversely shiftable record carriage, and a cooperating feeler ele-

ment, yieldable connecting devices between said feeler element and the cyclically operated means, releasable connecting devices including a latch between said feeler element and the determining means, and a device manually adjustable to release the latch and set the determining means.

4. In a listing calculator, the combination with a transversely shiftable record carriage, an accumulator, and cyclically operated means for effecting and recording a registration; of differentially settable means for determining the character of the registration, setting means including a graded element adjustable through the transversely shiftable record carriage, and a cooperating feeler element, yieldable connecting devices between said feeler element and the cyclically operated means, releasable connecting devices between said feeler element and the determining means including a segment provided with a cam surface and a latch carried by said segment and engaging the feeler element, and a manually adjustable device adapted to release the latch and provided with a roller engageable with the cam surface to set the determining means.

5. In a listing calculator, the combination with a transversely shiftable record carriage, an accumulator, cyclically operated means for effecting and recording a registration, and means cooperable with the registering means to take a total and including a total key; of differentially settable means for determining the character of the registration, setting means including a graded element adjustable through the transversely shiftable record carriage, and a cooperating feeler element, yieldable connecting devices between said feeler element and the cyclically operated means, releasable connecting devices including a latch between said feeler element and the determining means, a device manually adjustable to release the latch and set the determining means, and a stop adjustable by the total key into the path of movement of the feeler element.

6. In a listing calculator, the combination with a frame, a shaft mounted therein, accumulator wheels mounted upon said shaft, and cyclically operated means including reciprocatory segments for effecting and recording a registration; of means for determining the character of the registration including a cam on the register shaft, a cooperating cam mounted in the frame, connections between the cyclically operated means and the shaft and connections between the cyclically operated means and the cooperating cam, adapted to adjust both of said cams simultaneously relatively to each other, and means for regulating the degree of adjustment of one of said cams.

7. In a listing calculator, the combination with a frame, a shaft mounted therein, accumulator wheels mounted upon said shaft, and cyclically operated means including reciprocatory segments for effecting and recording a registration; of means for determining the character of the registration including a cam on the register shaft, a cooperating cam mounted in the frame, connections between the cyclically operated means and the shaft and connections between the cyclically operated means and the cooperating cam, adapted to adjust both of said cams simultaneously relatively to each other, and thereafter to return said cams to normal position one after the other, and means for regulating the degree of adjustment of one of said cams.

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