W. FUHRMANN.

SIGNAL PRINTING MEANS FOR CALCULATORS.

APPLICATION FILED MAR. 26, 1915.

1,166,978.

Patented Jan. 4, 1916.

3 SHEETS—SHEET 1.

FIG. 1

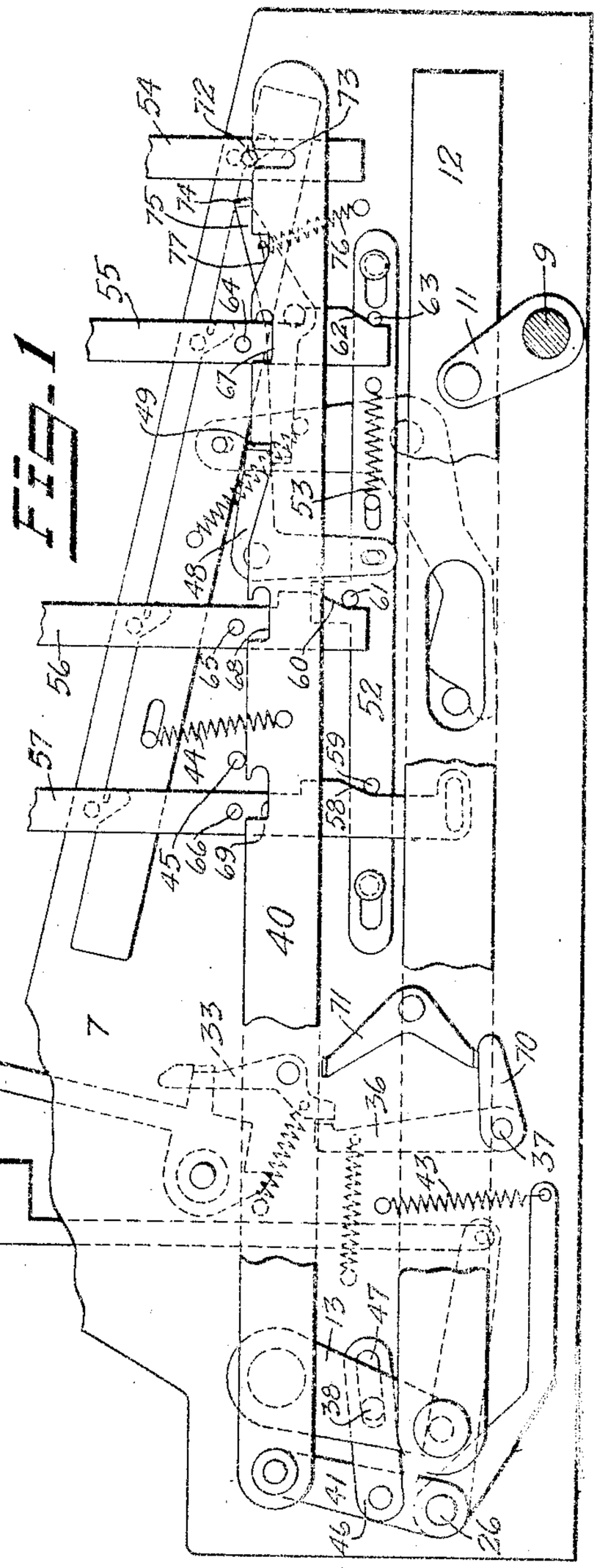
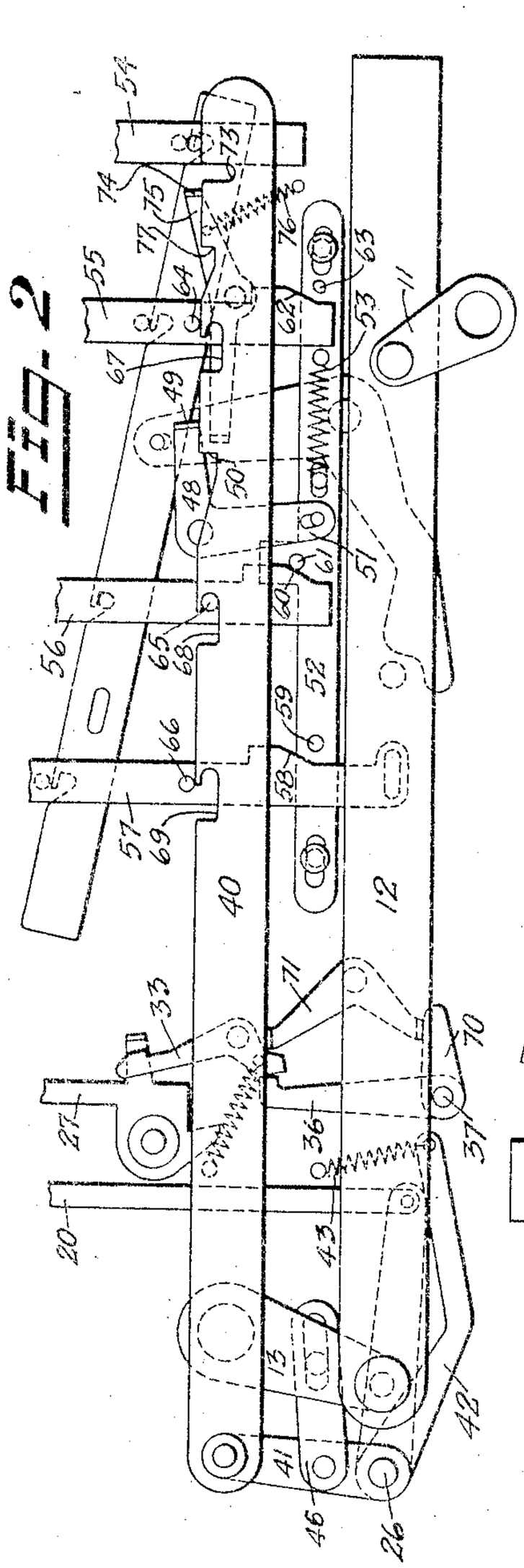


FIG. 2



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3 SHEETS—SHEET 2.

Fig. 3

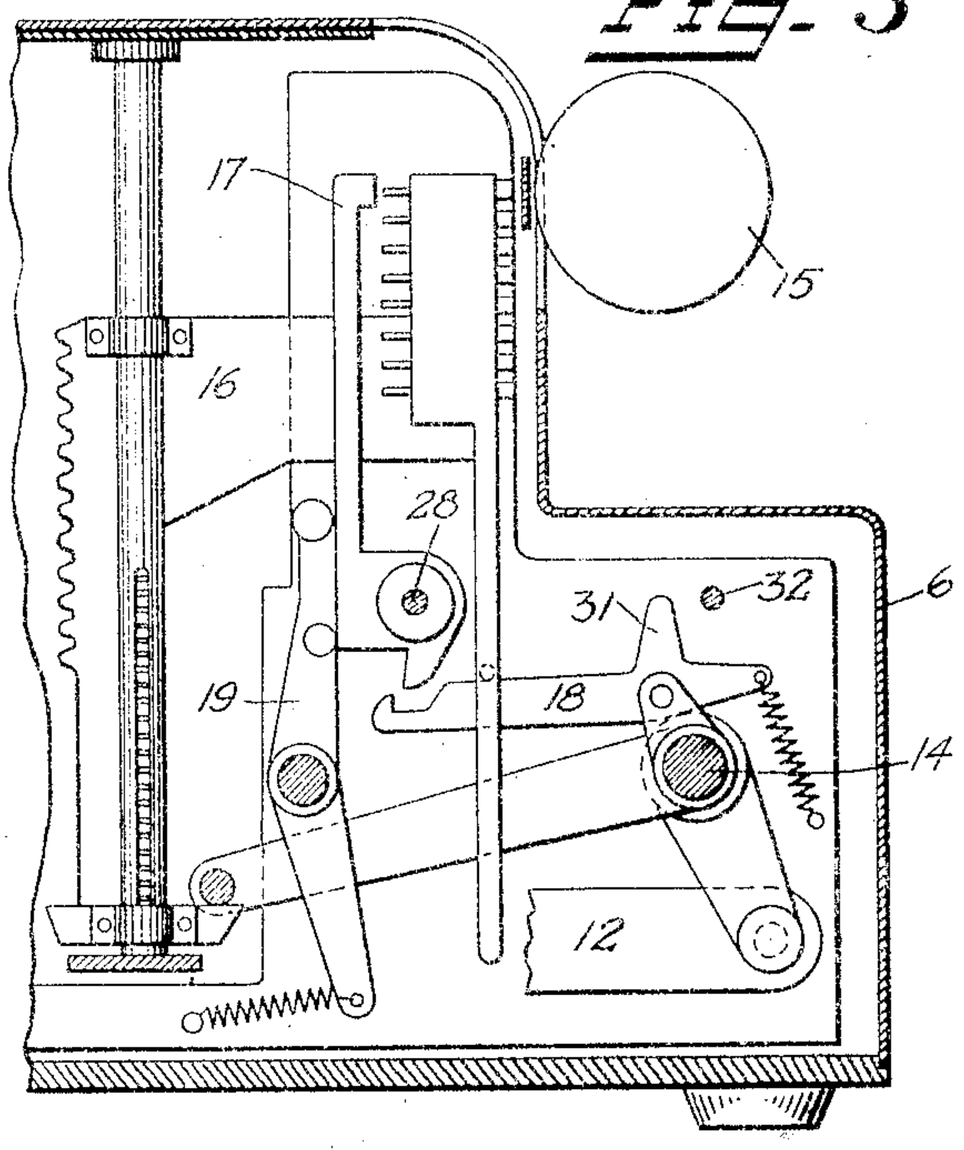
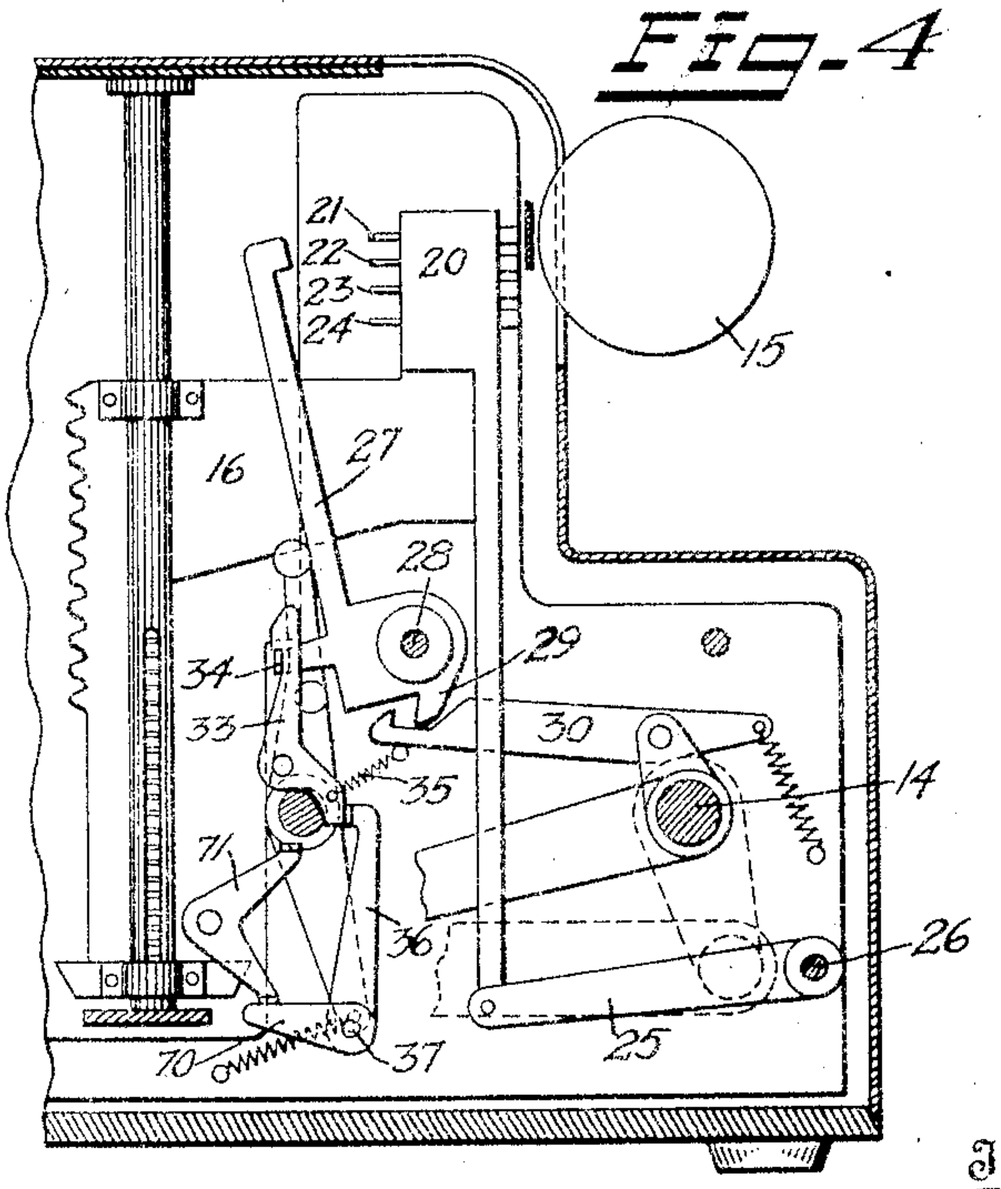


Fig. 4



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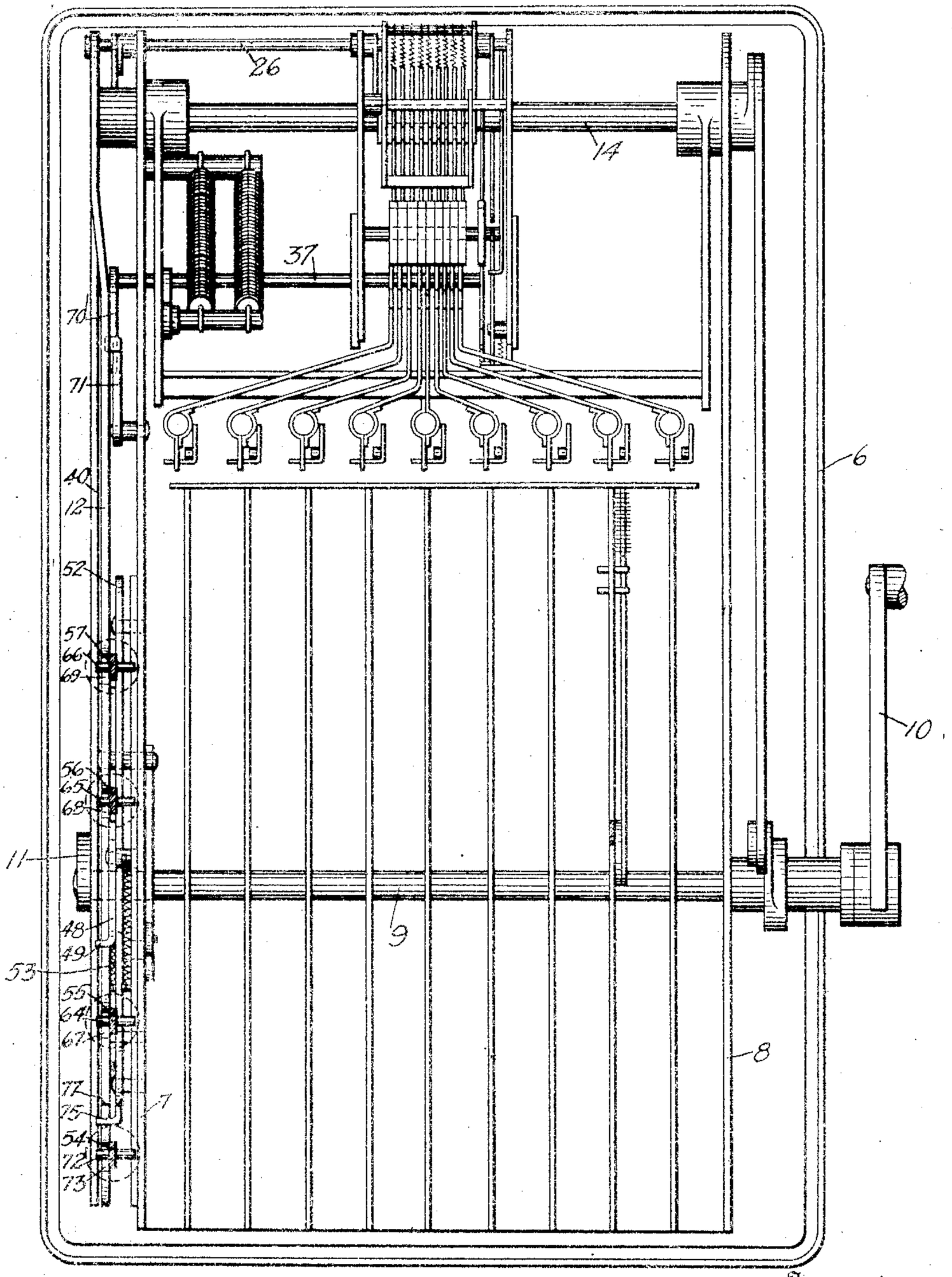
3 SHEETS—SHEET 3.

Fig. 5



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UNITED STATES PATENT OFFICE.

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SIGNAL-PRINTING MEANS FOR CALCULATORS.

1,166,978. Specification of Letters Patent. Patented Jan. 4, 1916.

Application filed March 26, 1915. Serial No. 17,104.

To all whom it may concern:

Be it known that I, WARREN FUHRMANN, citizen of the United States, and a resident of Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Signal-Printing Means for Calculators, of which the following is a specification.

This invention relates to means for printing signal characters or special marks in an adding machine adjacent special amounts that are printed on the record sheet and also to indicate other facts such as that an item or number has been accumulated, but not printed on the record.

In a Patent No. 1,092,497, granted April 7, 1914, to J. C. Lotterhand, is set forth and claimed means whereby the depression of a special key will, upon subsequent operation of the handle or motor shaft, cause a special operation of the machine different from the normal listing and accumulating of items, and which printing of the signal is effected at once upon the depression of the special key, and previous to any operation or movement whatever of the handle or motor shaft. In such construction a bar is provided that is normally tensioned and upon initial depression of one of the keys the bar is released and advanced by such tension means a distance differing according to the key depressed. And in such construction a further depression of the key causes the swinging of such bar and thereby effects the printing operation of the signal; which signal device is selected and positioned at the said first movement of the bar by its tension device.

In the present invention the multiple printing member is connected with a bar to be positioned according to the advance of the bar.—But in the present construction this bar is positively actuated by the depression of the key stem and at its initial movement. In the present construction the subsequent movement of the key stem after thus positively advancing or actuating the bar to position the printing member, produces through the releasing of a latch device, the printing operation of the printing member selected by the bar and placed in proper position.

The object of this invention is to positively and absolutely insure the shifting of the bar to position the printing member, at the initial depression of the special key stem, and at the final movement of the key stem the printing member is tripped or caused to make the impression by the selected printing member.

A further object of the invention is to provide in such a construction a latch device that will hold the bar in normal position under tension of an actuating spring, and which latch device will be tripped at the final movement of any of the special key stems.

A further object is to provide in connection with the latch device, a special latch that will serve to engage the bar when returned to normal position under tension and retain it in this position until the depressed special key stem has been restored to its normal position.

In the accompanying drawings illustrating one embodiment of my invention, Figure 1 shows a partial side plate of an adding machine with the parts relating to this invention. Fig. 2 is a similar view with a key depressed. Fig. 3 is a partial side elevation of the machine at the rear showing other printing members. Fig. 4 is a similar view showing the printing members for the signal printing; and Fig. 5 is a plan view of certain parts of the machine relating to the present invention.

The machine shown in Fig. 5 is of the form set forth in the said patent to J. C. Lotterhand, No. 1,092,497, and is shown in Fig. 5 as provided with a casing 6; the top being removed in this view. Side plates 7 and 8 are provided and suitably supported. A shaft 9 is shown extending across the machine and swung by a handle 10. This shaft carries a crank 11 pivoted to a side bar 12 on the left side of the machine. At the rear this bar 12 is connected with a crank arm 13, fast on a cross shaft 14 at the rear; permitting the bar 12 to move back and forth when the handle is swung.

At the rear of the machine, is shown a platen 15, in front of which slide rack and type plates 16 carrying the type 17. These plates 16 are positioned according to an item key depressed and moved vertically to bring the proper type opposite the platen. A printing hammer 17 is shown to strike the positioned type when the hammer is rocked. The hammer is engaged by a trigger 18 that is operated from the universal bar by means set forth in said patent, and also set forth in patent granted to J. C. Lotterhand, June 30,

1914, No. 1,102,157. At each operation of the handle of the machine, the trigger will engage the hammer and swing it back and then release it. The hammer is engaged by an energizer lever 19 that will be tensioned when the hammer is drawn back by the trigger, and will cause the hammer to strike a blow on the type when released by the trigger.

To print four signals adjacent the printing of the numbers by the rack and type plates 16, I provide a carrier 20 shown as provided with four type, 21, 22, 23, and 24. The carrier is shown as pivoted on an arm 25 fast on a shaft 26 extending across at the rear of the machine, as also shown in Fig. 5. As shown in Fig. 4 the carrier 20 is in its lower position with the type 21 opposite the platen. The rocking of the shaft 26 by means hereinafter set forth will raise the carrier to bring one of the other three type opposite the platen according to the amount of movement. To cause an impression by this type I provide a hammer 27 pivoted at 28, and having a beak 29 arranged to engage a trigger 30 similar to the trigger 18. It will be understood that the trigger 30 will be moved back and forth when the handle and other parts are operated. The trigger 18 is tripped from the hammer 17 by reason of an arm 31 striking a bar 32. But the trigger 30 is not provided with such an arm as 31. This trigger serves merely to draw the hammer back to the position indicated in Fig. 4, and it is latched in such position by certain means later described, so that when the trigger returns to normal position the hammer will remain latched and is not tripped from the trigger at the operation of the handle.

To hold the signal print hammer 27 in a set or cocked position I provide a latch 33 arranged to engage a lug 34 on the front of the hammer and hold the hammer in the cocked position as shown in Fig. 4; the latch being controlled by a spring 35. To trip the latch I provide an arm 36 fast on a cross shaft 37.

As best shown in Figs. 1 and 2, I provide a bar 40 fitted at its rear to an arm 41 that is fast on the shaft 26. An arm 42 is also secured to the shaft 37 and is connected to a coil spring 43 whose tension draws upward on the arm tending to rock the arm 41 rearward and to carry the bar 40 toward the rear. The bar 40 is normally retained in the position shown by means of a spring 44 that draws it upwardly against a stop 45. A link 46 pivoted to the arm 41, has its slotted end 47 engaging a pin 38 on the crank arm 13. When the handle 10 is operated to move the side bar 12 forward, at the latter part of the movement, the pin 38 reaching the end of the slotted link will draw the link toward the front, and swing the arm 41 provided it and the bar 40 have been drawn rearward by the spring 43. This restores these parts after they have been operated. The bar 40 is secured in this forward position by means of a latch arm 48 pivoted on the side plate 7 and having an ear 49, that projects over the top of the bar 40 in position to engage a shoulder 50 on the bar and retain the bar in the forward position, to which the bar is advanced by the link 46 as just described. The latch is in the shape of a bell crank whose lower arm 51 is pivoted to a slide 52 suitably guided to move back and forth on the side plates 7 and normally drawn rearward by a coil spring 53. This spring will tend to rock the latch arm to move the ear 49 downward into the shoulder recess in the bar 40. In these views are shown four special key stems 54, 55, 56 and 57 that may represent respectively the total, the sub-total, the non-print, and the non-add, considered in rearward sequence. Each of these key stems except the total key stem is provided with a cam or inclined face at one edge arranged to engage a pin on the slide 52, so that upon initial movement in depression of the key the slide will move forward to swing the latch ear 49 up away from the shoulder 50 of the bar 40. This release of the bar will permit it to be drawn rearward by the spring 43 pulling on the arm 42 and rock the arm 41. The stem 57 for the non-add key is provided with a cam 58 at its forward edge lying normally adjacent a pin 59 on the slide 52, so that at once upon depression of the stem 57 the slide 52 will move forward and rock the latch to release the bar 40. Similarly the stem 56 for the non-print has a cam edge 60 normally adjacent a pin 61, that at once on depression of this stem will rock the slide and cause tripping of the latch 48. Likewise the key stem 55 is provided with a cam edge 62 engaging a pin 63 on the slide 52 whereby on depression of the sub-total key stem the slide will at once shift and the latch will release the bar 40.

The carrier 20 as stated is provided with four signal type, and the uppermost of these 21, is normally in the printing position, and this may be the character for indicating the total. Therefore no shifting of the carrier is necessary. For this reason the sub-total key does not dislodge the bar 40 from the latch 48, and hence no connection between the total key stem 54 and the slide 52 or the latch 48 is provided.

Means are provided on these several stems, or those except the total, for governing the rearward movement of the bar 40 when unlatched, according to the key stem depressed to effect its release. The means I have employed are similar to those contained in the said Lotterhand Patent No. 1,092,497. The three key stems except the total, are provided with pins 64, 65, 66 respectively. The bar 40 is provided with recesses 67, 68 and 69 lying beneath said

pins respectively. It will be seen from Fig. 7 that these pins normally lie above the bar 40 and hence will not interfere with the rearward movement of the bar when the latch is shifted to release the bar. But depression of any one of these keys will move the pin into the recesses by the time that the key stem has descended a sufficient distance to shift the slide and latch to release the bar 40. Therefore the bar can only be drawn rearward by its spring 43 until the pin on the depressed key stem is engage by the shoulder at the forward edge of the recess. These three recesses are so arranged relatively to the coöperating pins, that the bar will be arrested in three different positions according to the key depressed, and consequently the carrier 20 will be elevated a corresponding distance. It will be understood that no rearward movement of the bar 40 is required to print the total since the carrier is normally in position with the total printing type opposite the hammer and platen.

Means are provided whereby on the further depression of any of the key stems, the latch arm 33 for the hammer 27 is shifted to release the cocked hammer and permit it to strike the new positioned carrier 20, so that the impression will be made at the latter part of the depression of the special key stem. The shaft 37 that carries the arm 36 engaging the latch 33, extends to the side of the machine and has fast thereon an arm 70 extending forward. On the side plate 7 is a lever 71 engaging the arm 70 by its lower end, while its upper end lies normally a very short distance below the lower edge of the bar 40. On depression of either of the key stems except the total, the said pin thereon will after the initial movement, engage the bar 40 at the bottom of the recess therein and swing the bar downward. This movement will bring the bar to engage the lever 71, which will rock the arm 70 and shaft 37, that will swing the latch 33 away from the hammer 27, permitting the cocked hammer to strike the positioned type in the carrier 20. The total key stem 54 is provided with a pin 72 that when the key stem is first depressed will enter the slot 73 in the bar 40, and the bar will not swing upon initial depression of this key stem. But at the latter portion of the depression of this key stem the pin 72 will strike the bottom of the slot 73 and swing the bar to trip the latch 33, causing the hammer to strike and print the total sign. It will be remembered that since the total type is normally positioned, the bar 40 does not require to be unlatched. The spring 53 engages the slide to draw it rearward and presses the latch against the bar 40, except when one of the key stems beyond the total one is not depressed to swing the latch upward. The depression of the total key stem 54 will swing the bar 40 downward and release it from the latch 48, but the slot 73 engaging the pins 72 on the key stem will prevent the bar 40 from moving rearward. And on return of the total key stem the bar 40 will be reëngaged by the latch 48.

It has been set forth that after this operation of the depression of any of the keys and the bar 40 is released to move rearward and position the type carrier 20, and thereupon the latch 33 releases the hammer to make the impression, the next operation of the handle to swing the side bar 12, will return the bar 40 to its forward position to reëngage the latch 48. At the same time the trigger 30 is swung as set forth to draw back the hammer 27, that will reëngage the latch 33, to remain cocked at the conclusion of the operation of the handle and side bar. This returns the bar 40 and the carrier 20 to their normal positions, and also causes the hammer 27 for the signal type to be left in the cocked position, so that the subsequent depression of any of the three special key stems will first position the appropriate signal type, and at the latter part of the depression of the key stem will trip the hammer to make the impression of the selected type. But if the bar 40 is returned to forward normal position and any of the keys should be retained depressed, after the side bar 12 completes its forward stroke and begins its return stroke, then the bar 40 would be held down by the key, and the slide 52 would be retained with the latch 48 elevated from the bar, and therefore the bar could not be relatched, and locked in its normal forward position. To overcome this deficiency, I provide a second latch 75 fitted to the side plate 7, whose ear 74 is pressed downward against the bar 40 by a spring 76. The bar is provided with a shoulder 77 arranged to engage the second latch 75 when the bar 40 is drawn forward a slightly greater distance than necessary for the ear 49 of the first latch to engage its shoulder 50. The latch 75 has its rear end extending under the latch 48 against which it is pressed by the spring 76 with a much less tension than that of the spring 53 that draws the latch 48 against the bar. It will be seen that when the latch 48 is swung up by the depression of the key stem, the latch 75 will be released to be drawn against the bar, and should the bar 40 be drawn forward by operation of the handle and side bar, when the latch 48 is elevated, the latch 75 will be free to follow into the notch and engage the shoulder 77, thus holding the bar 40 in the forward position. But as soon as the key stem is released and the slide will press the latch 48 downward again, the latch 75 will be raised out of the recess at the shoulder

77, and the bar 40 will be released from the latch 75, and will reëngage the latch 48.

Having thus described my invention what I claim is:—

1. In a calculating machine, a platen, a signal printing member shiftable to print a plurality of signals on the platen, a bar connected with the signal printing member and arranged to shift the member to different printing positions, means for advancing the bar to shift said member, a latch arranged to hold the bar against movement by said means, a set of keys, means for shifting said latch by the initial movement of each of said keys to thereby release the bar, means for controlling the movement of the bar when released according to the key depressed, and means for causing the operation of the printing member by the final movement of each key when depressed.

2. In a calculating machine, a platen, a signal printing member shiftable to print a plurality of signals on the platen, a bar connected with the signal printing member and arranged to shift the member to different printing positions, means for advancing the bar to shift said member, a latch arranged to hold the bar against movement by said means, a set of keys, means for shifting said latch by the initial movement of each of said keys to thereby release the bar, means for controlling the movement of the bar when released according to the key depressed, said bar being swung by each of the keys, and means for causing the operation of the printing member from the swing of the bar at the final movement of the key.

3. In a calculating machine, a platen, a signal printing member shiftable to print a plurality of signals on the platen, a bar connected with the signal printing member and arranged to shift the member to different printing positions, means for advancing the bar to shift said member, a latch arranged to hold the bar against movement by said means, a set of keys, means for shifting said latch by the initial movement of each of said keys to thereby release the bar, means for controlling the movement of the bar when released according to the key depressed, said bar being engaged by each of the keys at the latter portion of their movement to swing the bar and means for operating the printing means by the swing of the bar.

4. In a calculating machine, a platen, a signal printing member shiftable to print a plurality of signals on the platen, a bar connected with the signal printing member and arranged to shift the member to different printing positions, means for advancing the bar to shift said member, a latch arranged to hold the bar against movement by said means, a set of keys, means for shifting said latch by the initial movement of each of said keys to thereby release the bar, means for controlling the movement of the bar when released according to the key depressed, a hammer for the printing member, a trigger arranged to hold the hammer cocked, means for swinging the trigger from the swinging of said bar at the latter portion of the movement of each of the keys.

5. In a calculating machine, a platen, a signal printing member shiftable to print a plurality of signals on the platen, a bar connected with the signal printing member and arranged to shift the member to different printing positions, means for advancing the bar to shift said member, a latch arranged to hold the bar against movement by said means, a set of keys, means for shifting said latch by the initial movement of each of said keys to thereby release the bar, means for controlling the movement of the bar when released according to the key depressed, means for causing the operation of the printing member by the final movement of each key when depressed, and a second latch connected with said latch and arranged to engage the bar when the first latch is held tripped by a depressed key, whereby to engage the bar when returned to normal position, said second latch being released from the bar by the return to normal position of said first latch when the keys are restored.

6. In a calculating machine, a platen, a signal printing member shiftable to print a plurality of signals on the platen, a bar connected with the signal printing member and arranged to shift the member to different printing positions, means for advancing the bar to shift said member, a latch arranged to hold the bar against movement by said means, a set of keys, means for shifting said latch by the initial movement of each of said keys to thereby release the bar, means for controlling the movement of the bar when so released according to the key depressed, means for causing the operation of the printing member by the final movement of each key when depressed, means for returning the bar to normal position when advanced, means for holding the keys depressed after the return of the bar to normal position by said means, and a second latch connected with said latch and arranged to engage the bar when the first latch is held tripped by a depressed key whereby to relatch the bar upon return to normal position, said second latch being released from the bar by the return to normal position of the first latch by the key when restored.

7. In a calculating machine, a platen, a signal printing member shiftable to print a plurality of signals on the platen, a bar connected with the signal printing member and arranged to shift the member to different printing positions, means for advancing the bar to shift said member, a latch ar-

ranged to hold the bar against movement by said means, a spring for advancing the bar when released from said latch, a slide connected with said latch, pins carried by said slide, a set of key stems each having a cam face arranged to engage one of said pins at the initial advance of a key stem to thereby shift the latch to release the bar, means for controlling the movement of the bar when released according to the key stem depressed, and means for causing the operation of the printing member by the final movement of each key stem when depressed.

8. In a calculating machine, a platen, a signal printing member shiftable to print a plurality of signals on the platen, a bar connected with the signal printing member and arranged to shift the member to different printing positions, a spring for advancing the bar to shift said member, a latch arranged to hold the bar against movement by the spring, a set of key stems, means for shifting said latch by the initial movement of each of the keys to thereby release the bar, a pin on each of the key stems, stops on the bar arranged to engage the pin of a depressed key when the bar is shifted by the spring whereby to control the movement of the bar and positioning of the printing member, and means for causing the operation of the printing member by the final movement of each key stem when depressed.

9. In a calculating machine, a platen, a signal printing member shiftable to print a plurality of signals on the platen, a bar connected with the signal printing member and arranged to shift the member to different printing positions, a spring for advancing the bar to shift said member, a latch arranged to hold the bar against movement by the spring, a set of key stems, means for shifting said latch by the initial movement of each of the keys to thereby release the bar, a pin on each of the key stems, stops on the bar arranged to engage the pin of a depressed key when the bar is shifted by the spring whereby to control the movement of the bar and positioning of the printing member, means for swinging the bar by said pins on the key stems when depressed, and means for operating the printing member by said swing of the bar.

10. In a calculating machine, a platen, a signal printing member shiftable to print a plurality of signals on the platen, a bar connected with the signal printing member and arranged to shift the member to different printing positions, a spring for advancing the bar to shift said member, a latch arranged to hold the bar against movement by the spring, a slide connected with said latch, a set of pins on said slide, a set of key stems each having a cam surface arranged to engage one of said pins to move the slide and trip the latch upon initial movement of the stem to thereby release the bar, a pin on each said stem, a set of stops on the bar arranged to engage the pin of a depressed key when the bar is advanced by said spring, to thereby limit the advance of the bar, said bar being swung by the pins on the key stems at the latter part of the movement of the stem, and means for operating the printing member by the swing of the bar.

11. In a calculating machine, a platen, a signal printing member shiftable to print a plurality of signals on the platen, a bar connected with the signal printing member and arranged to shift the member to different printing positions, means for advancing the bar to shift said members, a holding device arranged to hold the bar against movement by said means, a set of keys, means for shifting said holding means by the initial movement of each of said keys to thereby release the bar, means for controlling the movement of the bar when released according to the key depressed, means for causing the operation of the printing member by the final movement of each key when depressed, means for returning the bar to normal position, and means for locking the keys depressed after the said return of the bar, said holding device being arranged to engage the bar when returned to normal position by said means while the keys are locked in depressed position.

12. In a calculating machine, a platen, a signal printing member shiftable to print a plurality of signals on the platen, a bar connected with the signal printing member and arranged to shift the member to different printing positions, a spring for advancing the bar to shift said member, a latch arranged to hold the bar against movement by said spring, a set of key stems, means for shifting said latch by the initial movement of each of said key stems to release the bar, means on the key stems and bar to govern the movement of the bar when released according to the key depressed, means connected with the bar to operate the printing member when the bar is swung, said bar being swung by each of the keys to operate the printing member at the latter portion of the key depression, a special key stem, means causing the special key stem to engage the bar at the latter portion of its depression to swing the bar and operate the printing means, and means for preventing advance of the bar when swung by the special key and released from said latch.

13. In a calculating machine, a platen, a signal printing member shiftable to print a plurality of signals on the platen, a bar connected with the signal printing member and arranged to shift the member to different printing positions, a spring for advanc-

ing the bar to shift said member, a latch arranged to hold the bar against movement by said spring, a set of key stems, means for shifting said latch by the initial movement of each of said key stems to release the bar, means on the key stems and bar to govern the movement of the bar when released according to the key depressed, means connected with the bar to operate the printing member when the bar is swung, said bar being swung by each of the keys to operate the printing member at the latter portion of the key depression, a special key stem, a pin on the special key stem, a slot in the bar arranged to receive the pin on the special key stem, whereby the special key stem will swing the bar at the latter portion of its movement to operate the printing mechanism, yet will prevent advance of the bar when free from the latch.

14. In a calculating machine, a platen, a signal printing member shiftable to print a plurality of signals on the platen, a bar connected with the signal printing member and arranged to shift the member to different printing positions, means for advancing the bar to shift said member, a latch arranged to hold the bar against movement by said means, a spring for advancing the bar when released from said latch, a slide connected with said latch, pins carried by said slide, a set of key stems each having a cam face arranged to engage one of said pins at the initial advance of the key stem to thereby shift the latch to release the bar, means for controlling the movement of the bar when released according to the key stem depressed, means for operating the printing member when said bar is swung, means for swinging the bar at the latter portion of each key stem movement, a special key stem, and means for causing the latter stem to swing the bar at the latter portion of its depression, and to hold the bar against advance movement when released from the latch.

15. In a calculating machine, a platen, a signal printing member shiftable to print a plurality of signals on the platen, a bar connected with the signal printing member to shift the member to different printing positions, a spring for advancing the bar to shift said member, a latch arranged to hold the bar against movement by the spring, a slide connected with said latch, a set of pins on said slide, a set of key stems each having a cam surface arranged to engage one of said pins to move the slide and trip the latch upon initial movement of the stem to thereby release said bar, a pin on each said stem, a set of stops on the bar arranged to engage the pin of a depressed key when the bar is advanced by said spring to thereby limit the advance of the bar, said bar being swung by the stem pins at the latter part of the movement of the stem, means for operating the printing member by the swing of the bar, a special key stem provided with a pin, said bar having a slot arranged to receive said latter pin whereby the bar is swung at the latter part of the depression of the special key stem, and which slot will prevent advance of the bar when swung by the pin therein upon release of the bar from said latch.

16. In a calculating machine, a platen, a signal printing member shiftable to print a plurality of signals on the platen, a bar connected with the signal printing member and arranged to shift the member to different printing positions, means for advancing the bar to shift said member, a latch arranged to hold the bar against movement by said means, a set of keys, means for shifting said latch by the initial movement of each of said keys to thereby release the bar, means for swinging the bar at the final movement of each key when depressed, a hammer for the printing member, a trigger arranged to hold the hammer cocked, means for cocking said hammer, a rock shaft, an arm on the shaft arranged to engage said trigger, a lever engaged by the said bar when swung, and an arm on said shaft engaged by said lever to swing the trigger from the bar.

17. In a calculating machine, a platen, a signal printing member shiftable to print signals on the platen, a bar connected with the signal printing member and arranged to shift the member to different printing positions, means for advancing the bar to shift said member, a latch arranged to hold the bar against movement by said means, a special key, means for shifting said latch by the initial movement of said key to thereby release the bar, means for controlling the movement of the bar when released by the depressed key, and means for causing the operation of the printing member by the final movement of said key.

18. In a calculating machine, a platen, a signal printing member shiftable to print a plurality of signals on the platen, a bar connected with the signal printing member and arranged to shift the member to different printing positions, means for advancing the bar to shift said member, a latch arranged to hold the bar against movement by said means, a key stem, means positively connecting the key stem with the latch whereby on initial depression of the key stem the latch will release the bar, and means for causing the operation of the printing member from the final movement of the key stem.

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