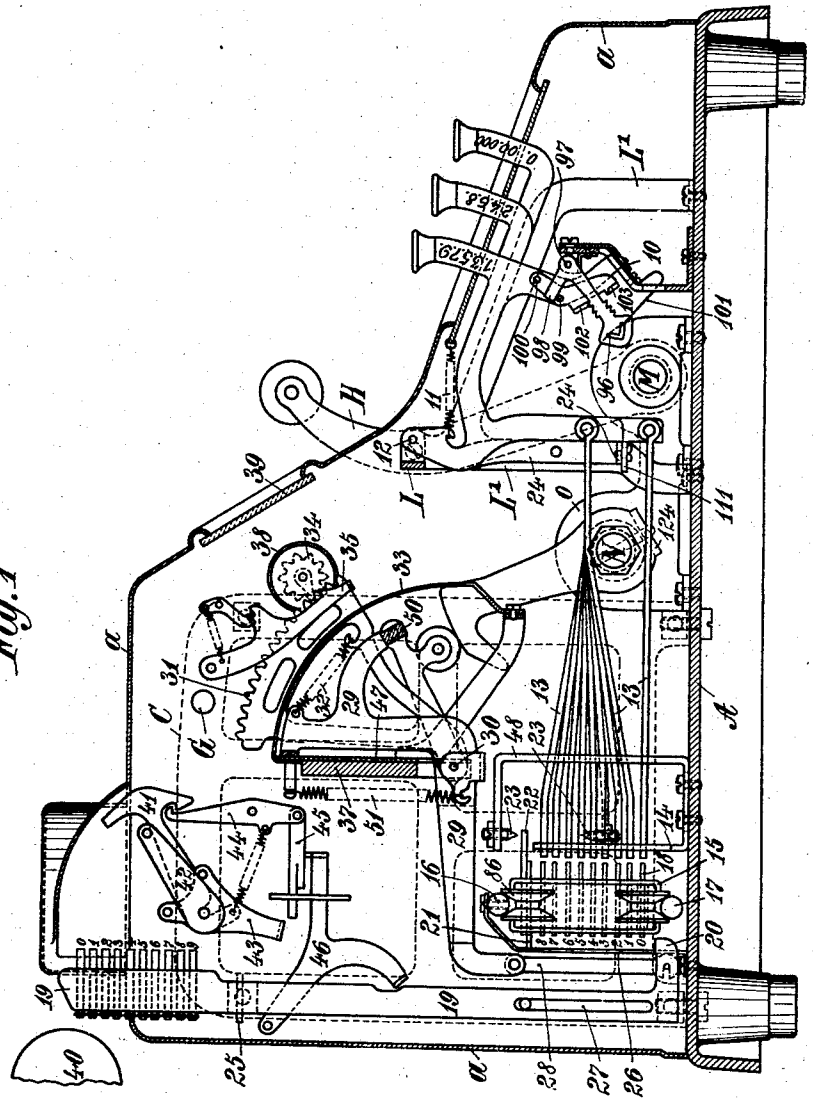
April 2, 1929. J. E. W. GREVE 1,707,303

ADDING MACHINE

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Fig. 1



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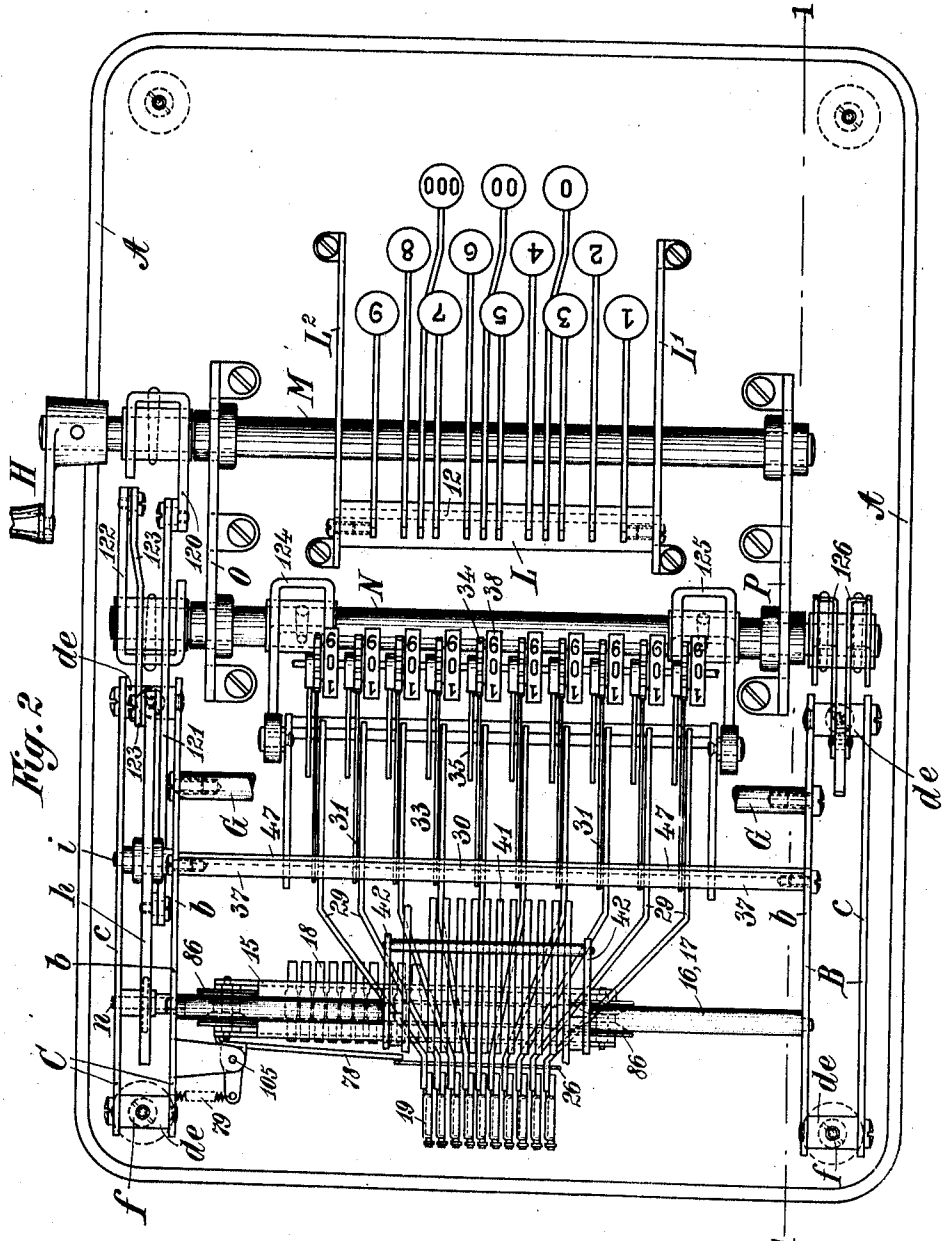


Fig. 2

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Fig. 3

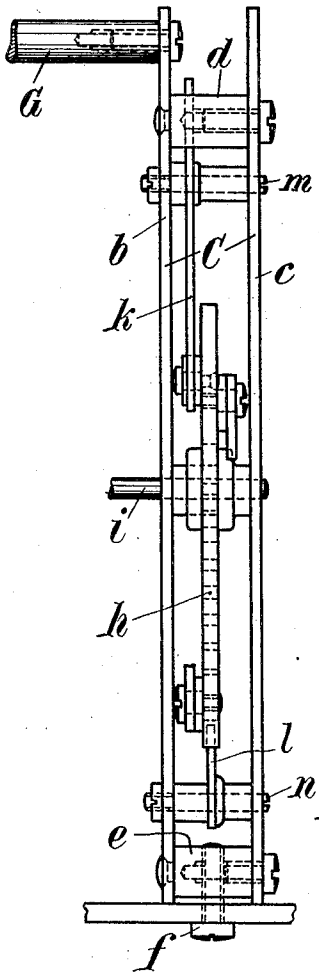


Fig. 8

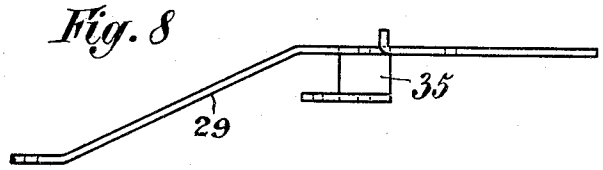


Fig. 9

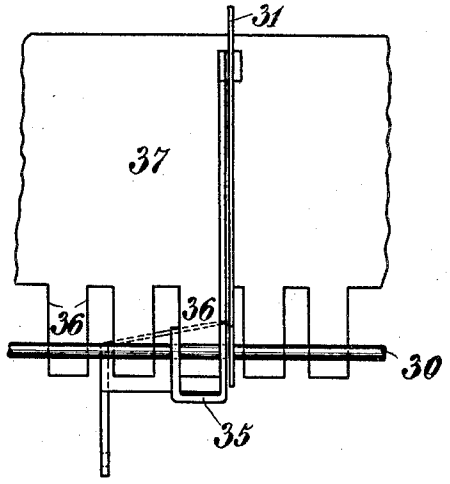


Fig. 11

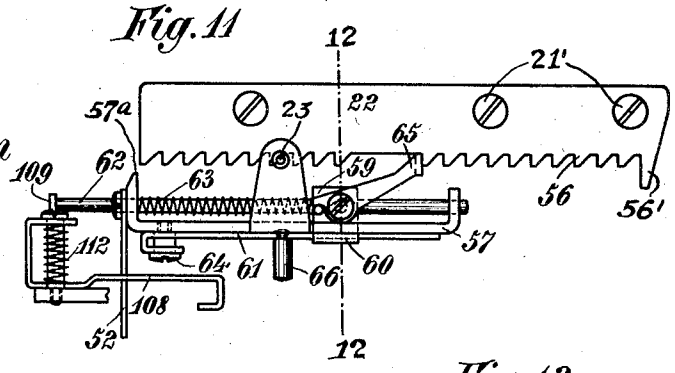


Fig. 10

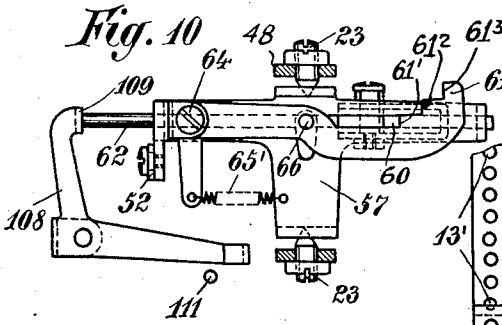


Fig. 16

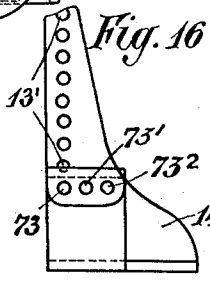
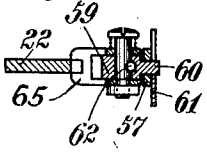


Fig. 12



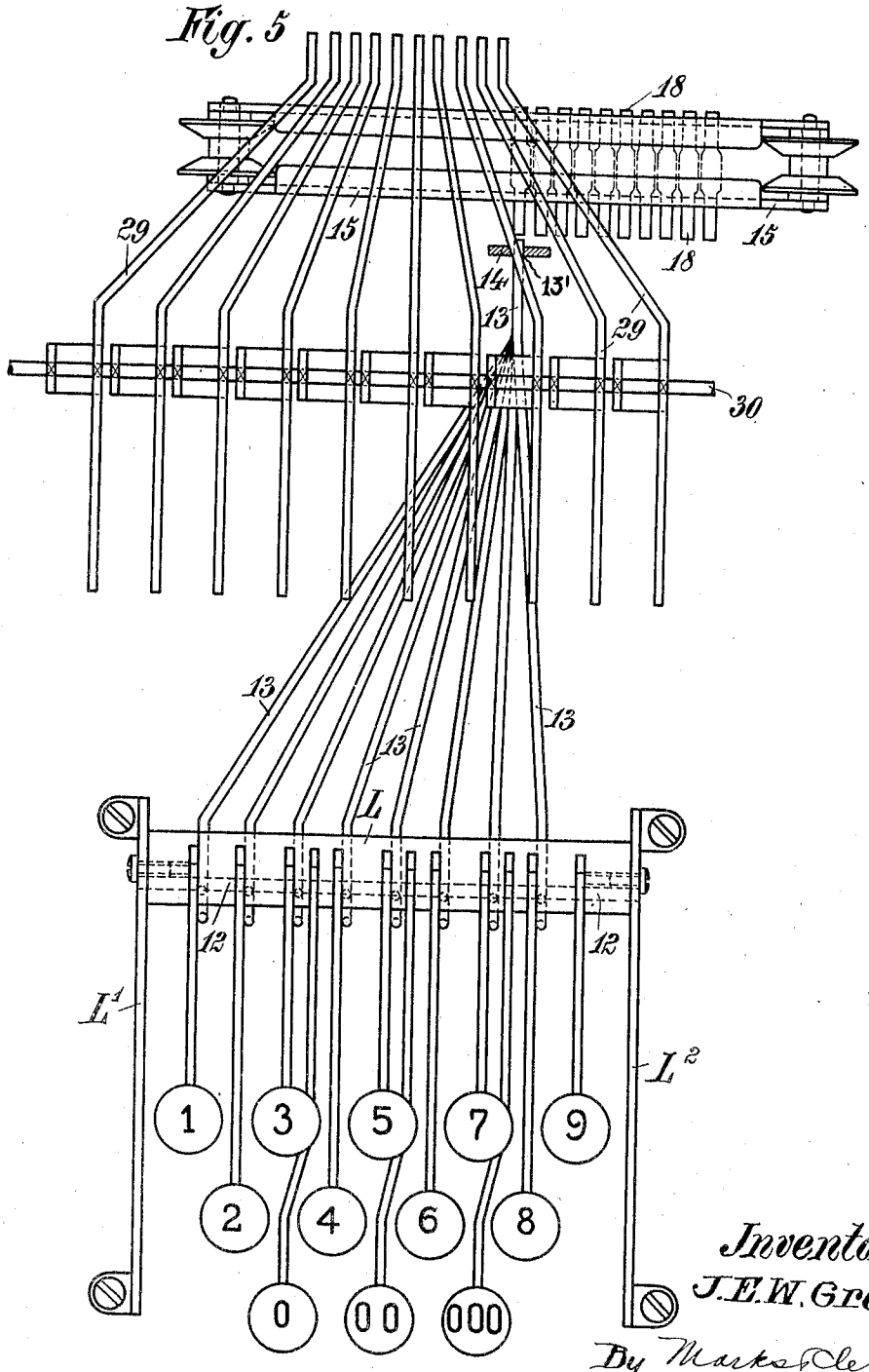
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ADDING MACHINE

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Fig. 5



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Fig. 4

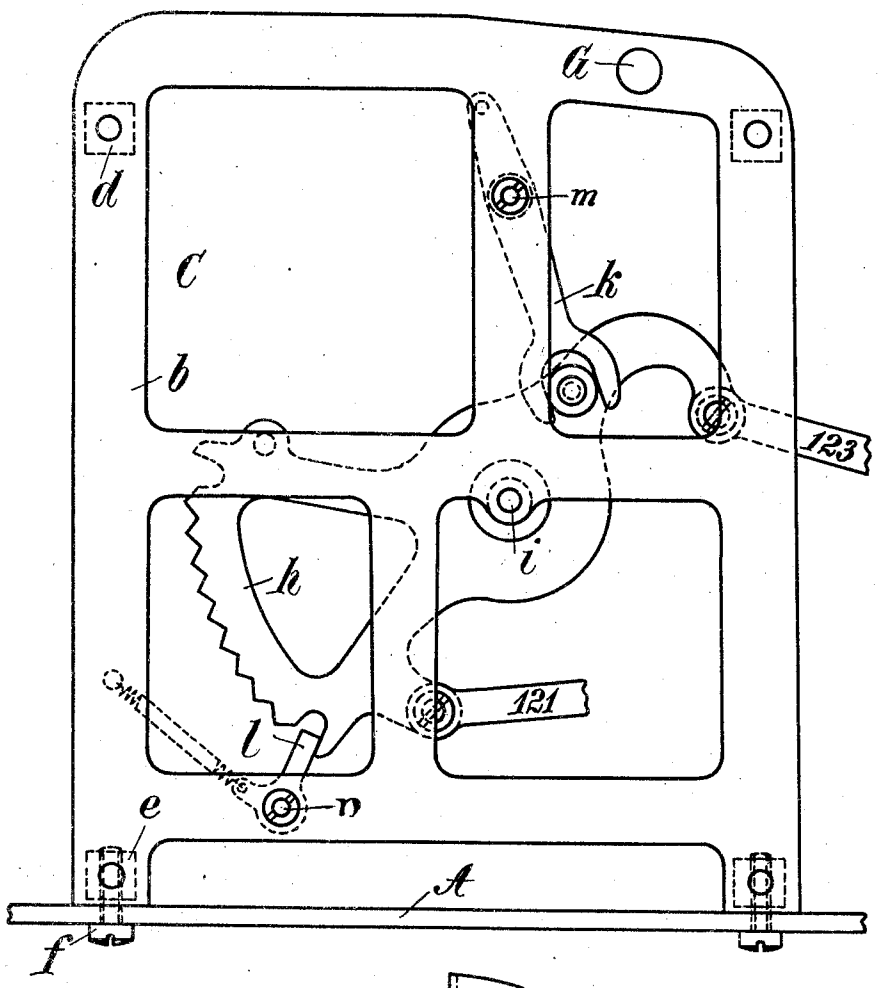
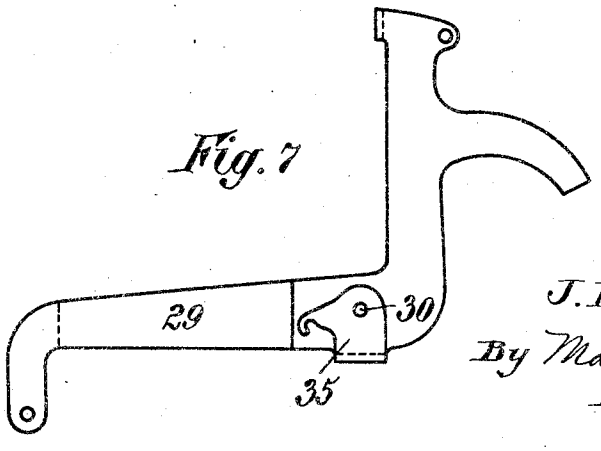


Fig. 7



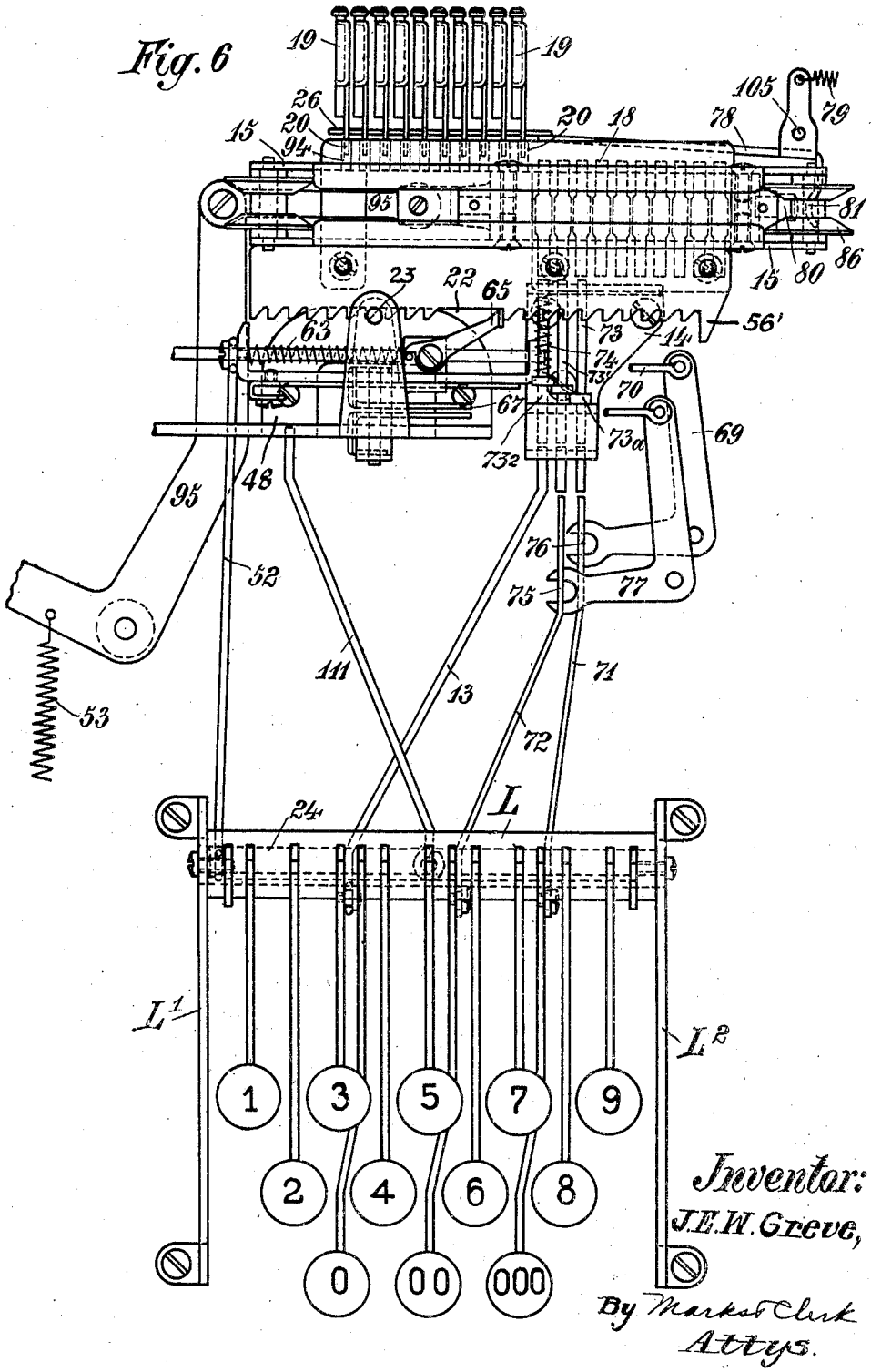
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Fig. 6



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Fig. 13

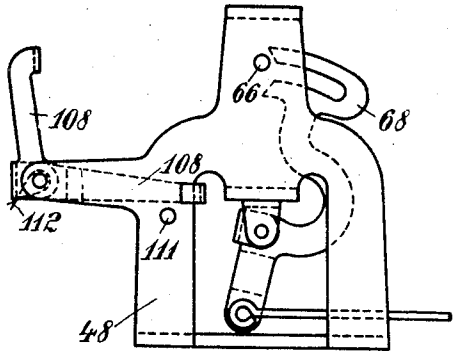


Fig. 14

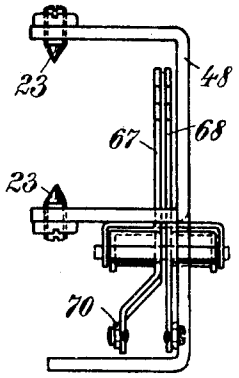


Fig. 15

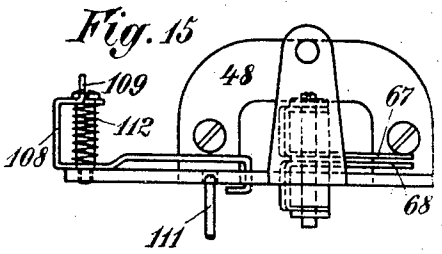


Fig. 19

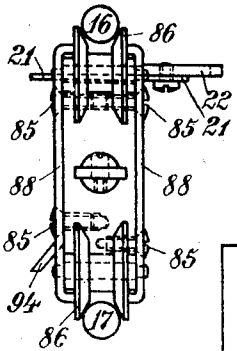
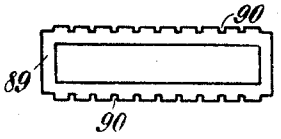


Fig. 20



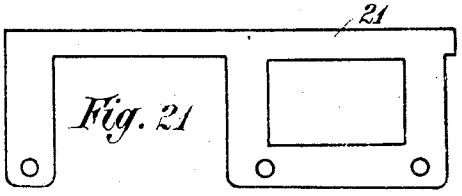


Fig. 21

Fig. 23

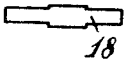


Fig. 24

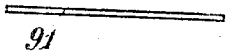


Fig. 22



92 93

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Fig. 17

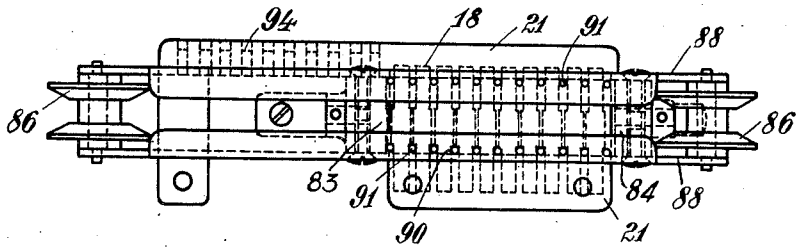
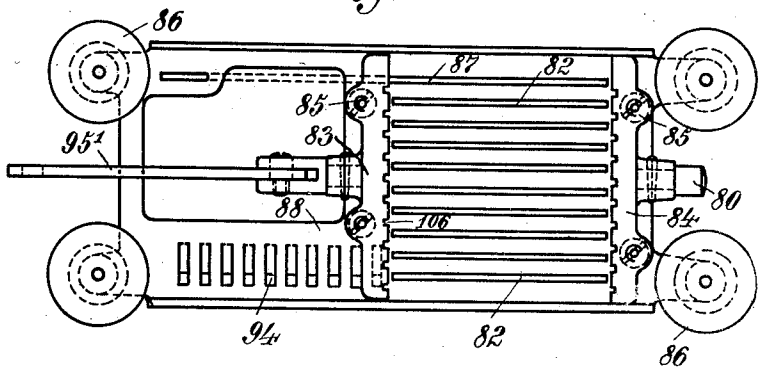


Fig. 18



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Patented Apr. 2, 1929. 1,707,303

UNITED STATES PATENT OFFICE.

JOHN EMIL WILLIAM GREVE, OF CHEMNITZ, GERMANY.

ADDING MACHINE.

Application filed April 25, 1921, Serial No. 464,398, and in Germany January 26, 1920.

In adding machines provided with printing mechanism both the counting apparatus and the printing mechanism should be arranged so as to be easily visible and readily accessible to the operator, in order to make possible quick working. Machines with invisible printing and those with invisible counting apparatus are of course considerably simpler in construction than those in which, with a view to rendering visible the writing and the figure or number contained in the counting apparatus, the printing and the counting apparatus are arranged at a prominent point of the machine. The transmission parts and the connections between the single sets of mechanisms in most machines provided with visible printing and counting devices are as a rule so numerous and so complicated as to give frequent rise to trouble or to render the running of the machine difficult. These difficulties which are more particularly noticeable in machines with a single set of keys, have hitherto prevented the construction of such machines, that is to say machines having a single set of keys, visible printing, and visible counting apparatus.

The present invention overcomes these difficulties by a certain arrangement of the various sets of mechanisms relatively to each other, owing to which the whole machine becomes simpler, more reliable and smaller than those hitherto known, and has also advantages as regards facility of manipulation, visibility shape and simplicity of erection.

A construction according to this invention is illustrated by way of example in the accompanying drawings, applied to a machine with several zero keys.

In the said drawings,

Figure 1 is a longitudinal section through the machine on the line 1—1 of Fig. 2,

Figure 2 a plan with the printing roller omitted,

Figures 3 and 4 a front and a side elevation respectively of one lateral frame,

Figure 5 a part plan of the key board and of the setting parts for the quadrants driving the counting apparatus,

Figure 6 a partial plan of the advance lock and of the setting parts carriage,

Figures 7 and 8 show a setting arm for the quadrants, looking from the side and from the top respectively.

Figure 9 shows the method of mounting a setting arm with an adjoining quadrant, seen from the front,

Figures 10–15 illustrate the advance lock for the setting parts carriage, Fig. 10 being a view seen from the front.

Fig. 11, a plan, Fig. 12, a section on the line 12—12 of Fig. 11.

Figs. 13 and 14, views of the mechanism for the hook 68.

Fig. 15 a plan thereof.

Figure 16 the guide bracket for the push rods,

Figure 17 is a plan of the setting parts carriage,

Fig. 18, a front elevation thereof and

Fig. 19, an end view.

Figs. 20 to 24 are details.

The machine is mounted on a bed plate A and enclosed in a casing *a*. At each side of the machine is arranged a frame B and C (Figure 2), these frames carrying various parts of the machine. Each of the two frames B, C is constituted by two stamped-out parts *b*, *c*, see also Figs. 3 and 4, connected together by spacers *d* and *e* and secured to the bed plate A by means of screws *f* which pass through the spacers *e*. Owing to the distance between the parts *b* and *c*, the whole frame B (Figures 2, 3 and 4) is given a comparatively wide support and stands very firmly on the bed plate A, this firm stand being still further improved by a rod G and cross-bar 37 connecting it to the frame C on the other side of the machine.

Between the walls *b* and *c* of the frame C, on a spindle *i* is mounted a locking quadrant *h* which can be moved by turning the crank handle H, the said spindle *i* passing through the two walls so that, in view of its being guided at two places, it can be made very thin in spite of the great strains to which it is exposed. Other parts such as a lever *k* and pawl *l*, are also arranged between said walls *b* and *c* and can turn on screws *m* and *n* (Figure 3) respectively screwed into the lateral wall *b* and secured by a lock nut, whilst their stem or head end is guided in the other lateral wall *c*.

This arrangement avoids, in spite of heavy strains, any loosening of the screws and causes very little friction as the diameter of the screws can be made very small. Owing to the screws and spindles being of small diameter the hubs of the parts secured by the same are also smaller which results in a saving of space.

The general arrangement of the main parts of the machine can be seen in Figures 1 and

2. In front are arranged in three rows the keys, the figure keys 0, 00, and 000 and 1 to 9 being rotatably mounted on a spindle 12 supported by a cross bar L situated between frames L^1 and L^2. A joint locking device 10 (Figure 1) ensures that it is possible to depress only one key at a time, which key thereupon springs upwards again under the pull of a spring 11, like a typewriter key. Each of the figure keys, with the exception of the "nine" key is jointed or pivoted to a push rod 13 (Figures 1 and 5), the free end of which projects into holes 13′ (see Fig. 5 and 16) situated in a vertical line in a guide bracket 14.

The movable stop pin carriage 15 is adjustable transversely of the longitudinal axis of the machine and is guided by means of two upper and lower rollers 86 (see also Figs. 17 and 18) between spindles 16 and 17. The said carriage has ten vertical rows of movable stop pins 18 (see also Fig. 23) which, on being pushed forward, form a limit or stop for the upward movement of the type carriers 19 by catching the projections or fingers 20 of the latter. As many type carriers are provided as there are vertical rows of movable stop pins, and accordingly it is possible to print with this machine numbers of ten digits.

In one vertical row there are nine movable stop pins for setting the figures 0 to 8, whilst for the "nines" of all the type carriers a stop constituted by a fixed ledge 21 the form of which is shown in Fig. 21 is provided on the movable stop pin carriage. The "nine" figure key does not therefore possess any push rod 13. The holes 13′ in the guide bracket 14 agree with the distances between the movable stop pins. It will be seen that the keys, by means of the push rods 13 pivoted to them, cause the advance of the movable stop pins, without the use of any transmission parts such as bell crank levers or the like. The movable stop pin carriage 15 has a tooth rack 22 which is secured by screws 21′ which co-operates with an escapement (Figures 6, 10 and 11—in Figure 1 omitted for the sake of clearness), which is rotatably mounted between pointed screws 23 on a bracket 48 secured to the bed plate A. On a figure key being struck said lock is operated by a bar 24, (Figs. 1 and 6) which is one and the same for all the keys and is mounted on their pivot 12, through a rod 52 (Figure 6). Thus the movable stop pin carriage is released and as it is always pulled to the left by the tension of a spring 53, bell-crank lever 95 and rod 95′, it will spring forward to the extent of one place in the said direction whenever a key is struck.

The type carriers 19 (Figure 6) guided in plates 25, 26 and slot 27 (Fig. 1), are coupled by means of rods 28 to setting arms 29 which are formed into double levers rotatably mounted on a spindle 30 and control the movement of sectors 31.

The lower boss of the rods 28 does not form a closed joint, but is slotted in such a manner that the type carriers 19 can be released from the rods 28, for the purpose of removing them from the machine, simply by pulling them out of the slots, without having to undo any screws or other connections. The guide plate 26 for the projections 20 of the type-carriers 19 prevents the rods 28 from sliding off from the type-carriers during normal working.

The setting arms 29 are cranked outwards with their arms engaging with the rods 28, approximately up to the axis of rotation 30 as shown in Figures 2 and 5, whilst their arms extending from the axis of rotation towards the keys, are parallel and directed upwards. Under their bearings, the setting arms 29 have a lug which is bent twice to one side so as to form a saddle 35 (Figures 7–9) open at the top. The spindle 30 passes through the two lateral walls of said saddle so that the arms 29 are given a wide support on said spindle which is arranged in a groove of the cross-bar 37 which is provided with such recesses that projections 36 thereon fit into the saddle 35 (Figure 9). In that way the lateral position and the distances of the setting arms 29 are fixed. A covering plate 47 (Figs. 1 and 2) prevents the spindle 30 dropping out of the groove. Owing to this new arrangement, the spindle 30 is supported in every recess of the cross bar 37 and can therefore be made of small diameter, for instance be a steel wire, which is a great advantage for the purpose of supporting the setting arms 29 and ensuring easy running.

Next to the setting arms 29 on the spindle 30 are rotatably mounted sectors 31, the upper ends being guided in a slotted sheet metal plate 33 (Figure 1) above which are arranged the counting gears 34 and the tens carrying mechanism. The guide plate 33 is secured to the cross-bar 37 and can therefore be removed from the machine with the latter, the setting arms 29 and the sectors 31.

The setting arms 29 are connected to the sectors 31 by means of springs 32 for the purpose of the tens transfer, which does not form part of the invention and therefore will not be described.

The counting gear wheels carry visible wheels 38 provided with figures, on which the number which may be contained at the time in the counting gear, can be read through a window 39 of the casing a of the machine. The figures set on the machine, are printed on a roller 40 (Figure 1) after the setting of the type-carriers 19, in a manner well known in itself, by means of the printing mechanism 41—46.

This new general arrangement of the machine has great advantages as regards visi-

bility, facility of manipulation and better appearance as the counting gear and the printing mechanism are arranged in steps behind the key board as shown in Figure 1, and therefore are in a position in which they can be easily seen by, and are accessible to the operator of the machine.

Another advantage is that with exceedingly simple means, the single sets of mechanisms are connected together, owing to which the erection is greatly simplified, and a very easy running of the machine ensured.

These advantages are more particularly important in a machine with several zero keys, by means of which several zeros can be set by striking only once. By striking one of the several zero keys, the movable stop pin carriage 15 is advanced through several units of travel, through the intermediary of the escapement. In that way the movable stop pin carriage is released and thereupon pulled always to the left by the tension spring 53, bell crank lever 95 and rods 95^1 (Figure 6) and springs forward in this direction whenever a key is struck.

The advance lock (Figures 10–15) comprises a body 57 mounted rotatably about its vertical axis between the pins 23. The said body has at its ends bent lugs through which passes a steel rod 62 adjustable in its longitudinal direction. To the said rod is secured a part 59 (Figures 11 and 12) which carries a loose advance tooth 65 formed into a pawl which engages in the teeth 56 of the rack 22 of the carriage 15. A projection 60 of the the part 59 is guided in a longitudinal hole of the body 57 and thus prevents the rod 62 from turning and at the same time forms a stop to a step lever 61. Against the part 59 presses a spring 63 arranged round the rod 62 and resting against the left bent end of the body 57, said spring projecting said rod with the part 59 to the first step 61′ of the lever 61 as soon as a key is depressed, and the loose advance tooth 65 is thereby disengaged from the teeth 56 of the rack 22. At the same time, owing to the turning of the body 57, a fixed tooth 57^a which is formed by the left bent end of the body 57, comes into engagement with the rack 22 and prevents the movable stop pin carriage 15 from moving to the left, until during the return of the depressed key to its position of rest, this fixed tooth 57^a comes out of engagement again, and the pawl 65 engages with the teeth 56. Owing to the movement of the carriage to the left, which then takes place, the rod 62 previously advanced by the spring 63, is forced with the pawl back to the position of rest.

The loose tooth 65 is formed into a pawl so that it passes over the teeth 56 and enables the movable stop pin carriage to be pulled back.

Similar escapement are already known, but according to the invention, the escapement is so designed that on the zero keys being operated, it not only produces one travel unit, but also controls the movement of the carriage through greater distances.

To that end, the stop lever 61 in the construction illustrated is provided with three steps 61′, 61^2, 61^3 and is controlled by two keys 00 and 000. Moreover it is rotatably mounted on the body 57 at the point 64 and is always pulled upwards by a spring 65^1, so that the first step 61′ forms during the normal working the limit for the springing forward of the pawl 65. The lever 61 has a pin 66 which is seized by cam levers 67 and 68 (Figures 14 and 15), and owing to their shape, pulled down as soon as one of the keys 00 or 000 is operated.

Assuming that the key 000 is struck, it will turn, through the intermediary of the bar 24 (Figures 1 and 6) and of the rod 52, the escapement body 57 about the pins 23, so that the loose tooth 65 will be disengaged from the rack 22 and pushed forward by the spring 63. At the same time, the push rod 71 (Fig. 6) of the key 000 has turned a bell crank lever 69 secured to the bed plate of the machine, which lever is connected by a rod 70 to the cam lever 67 (Figures 13 and 14) and turns the latter. The cam or curve of the said lever pulls down the stop lever 61 by means of its pin 66 until the third step 61^3 is brought into the path of the advancing part 59 or of its projection 60 (Figures 10–12). The loose pawl 65 has now advanced not to one, but to three units of travel, and allows therefore of a corresponding movement of the movable stop pin carriage 15 as soon, as during the return of the key 000, the said pawl engages again with the rack 22 and is returned by the latter to the position of rest. As soon as the key 000 is again in the position of rest, the cam lever 67 has released the pin 66 of the stop lever 61 and the latter also returns to its initial position under the action of the spring 65^1.

The working of the key 00 is the same, only it operates the cam lever 68 which pulls down the stop lever 61 only to the second step 61^2, owing to which the loose advance tooth 65 produces only two, instead of three travel units.

The last tooth 56′ of the rack 22 is longer than the remaining ones, in order that the movable stop pin carriage 15 should not be able to pass beyond the reach of the loose tooth 65.

The striking of the figure keys produces the advance of the movable stop pin 18 from the carriage 15 as stops for the type carrier projections 20. When keys with several zeros are operated, two, three or more setting parts must be set simultaneously in accordance with the keys, for which purpose a driver 73 is arranged opposite the rod 71 of the key 000 (Fig. 6), a driver 73^1 opposite the rod 72 of

the key 00 and a driver 73^2 opposite the rod 13 of the key 0. Flanges or collars 73^a are provided on these drivers in such a manner that the flange or collar of the driver 73^1 is behind the flange or collar 73^a of the driver 73^2 and the flange or collar of the driver 73 is behind the driver 73^1 so that by striking the key 000, all three drivers and therewith the movable stop pins of the keys 0, 00 and 000 are advanced simultaneously. By operating the key 00, only the movable stop pins of the keys 0 and 00 would be accordingly advanced.

The drivers 73 for the figure keys are mounted in the guide bracket 14 (Figure 16) of the push rods 13, and owing to their position relatively to each other, are held back by only one spring 74 (Figure 6) placed round the driver 73^2 of the key 0. The push rods 71 and 72 are provided with projections or fingers which project into forks 75 and 76 of the bell-crank levers 69 and 77 and operate the latter.

In the lateral frame of the machine, behind the movable stop pin carriage 15, is rotatably mounted about a spindle 105 (Figures 2–6) a plate 78 which is intended to force back again the advanced movable stop pins 18 in a number set, during the return of the carriage. In the position of rest, the plate is always held away from the movable stop pins by a spring 79, so that the said movable stop pins can be advanced by the keys without touching the plate. When after a number has been printed, the movable stop pin carriage 15 is brought back by the mechanism of the machine, its bolts 80 strikes an arm 81 of the plate 78 and produces a turning of the latter, owing to which the advanced movable stop pins 18 are again forced back into the carriage 15. The carriage thereupon moves another place to the left, that is to say away from the arm 81, owing to which the plate 78, under the action of the spring 79, again swings away from the carriage.

The arrangement of the movable plate 78 has the advantage that the movable stop pin carriage 15 is moved back without friction which otherwise would be caused by depression of the movable stop pins, and that the momentum of the carriage is utilized for forcing back the movable stop pin when the carriage strikes the lever arm 81 of the plate.

For a quick advance of the movable stop pin carriage, more particularly for the advance over larger distances, it is necessary, in addition to a quick working escapement, that the carriage itself should be made as light as possible. In this respect the movable stop pin carriage according to the invention differs advantageously from the well known ones.

The carriages possesses a front and a rear wall 88 (Figures 17–19) provided with slots 82 intended to receive the movable stop pins 18. In Figure 18 the front plate is assumed to have to have been removed, and the connection between the two walls is shown by means of intermediate parts 83 and 84 provided with grooves 106, the walls being secured to the said intermediate parts by means of screws 85. Between the lateral walls 88 of the carriage are mounted the guide rollers 86 on bolts provided with collars. The walls have nine slots 82 intended to receive the movable stop pins 0 to 8, and above them a longer slot 87 in one wall, which receives the plate 21 forming the stop for the "nines". In the grooves 106 of the intermediate parts 83 and 84 are arranged horizontal distance pieces 89 (Figure 20) with notches 90 into which are placed wire rods 91 (Figure 24) which ensure the distances for the movable stop pins 18 (Figure 23) in the horizontal position. On each distance piece 89 rests a spring blade 92 (Figure 22) which presses with a finger 93 against each movable stop pin of the corresponding horizontal row and slightly brakes it, so that it cannot move accidentally from the setting carriage owing to vibrations of the machine. The rods 91 are intended both for ensuring the lateral distance for the movable stop pins and for protecting them from dropping out, as the movable stop pins are made thicker in the central portion and cannot pass between two rods. By screwing on the second movable stop pin carriage wall 88 on the intermediate parts 83, 84 all the parts are protected from dropping out.

In the position of rest of the movable stop pin carriage, that is to say, when no number is set, the type carriers 19 must be locked as soon as the machine is operated, and they must be released when an adding operation is carried out. To that end, locking parts 94 (Figures 6, 18 and 19) for the type carriers are pressed out direct from the rear wall 88 of the movable stop pin carriage. In the position of rest of the movable stop pin carriage, these locking parts are situated in the path of the projections 20 of the type carriers (Figure 6) and by turning over the adding lever (not shown) which operates the lever 95 are moved to such an extent to the right with the movable stop pin carriage that the projections 20 of the type carriers can pass through the spaces between the locking parts 94.

The locking parts 18—also in order to make the movable stop pin carriage as light as possible—are simply stamped out parts, and work without any separate locking devices and spring required for the same, as is necessary in other machines. In all machines it is necessary that a movable stop pin which has been partly pushed forward by an unintended pressure on the key, should be brought back to the initial position before the escapement is operated, as otherwise when a higher figure

is struck, not the said figure but that of the previous unintentionally operated one, will be printed. For that reason the locking devices for the setting parts in well known machines are set so as to act exactly in time with the escapement, which is not the case in the present invention, for reasons already stated. But on the other hand all the figure keys are provided with a safety device which prevents from the start any of the movable stop pins from being only partly advanced.

This safety device 10 comprises a pawl 96 (Figure 1) with two series of teeth; for each key is provided one such pawl rotatably mounted at its upper end about a pin 97 and provided with a tail 98 which is operated by pins 99 and 100 on the key. In the bottom end of the pawl 96 is provided an angular slot with which engages the bent end of a spring 101 which is secured by screws to a bracket 10 of the key locking device. Under the lower end of all the figure keys project two tooth-like lugs 102 and 103 secured to the keys and alternately co-operating with the teeth of the pawl 96. In the position shown in Figure 1, all the parts are in the position of rest in which the spring 101 acts on the angular slot of the pawl in such a manner that its upper teeth co-operate with the tooth 102 and lock the key, if it is only partly depressed. If however the key is depressed completely, the pin 100 strikes the tail 98 of the pawl 96 and turns the latter so that its lower teeth co-operate with the tooth 103 of the key. In this position the pawl 96 is held during the return of the key also by the spring 101 which now engages with the other end of the angular slot and therefore exercises on the lever a pressure in the opposite direction to the previous one. Only when the key is raised, the pin 99 strikes the bottom edge of the tail 98 and brings the pawl again into the position illustrated. Owing to this arrangement, the keys are prevented from returning to the position of rest when they have not executed their complete movement, or from being depressed again before they are fully in the position of rest. In that way proper advance of the movable stop pins is ensured, and the movable stop pin carriage is freed from mechanisms intended to produce that effect.

The machine described by way of example in the foregoing, is provided with three zero keys, but it could also have a greater number than three provided that the movement of the loose advance tooth 65, which is limited by the stop lever 61, is increased. In such a case it may however happen that the movement of a key with several zeros takes place more quickly than the loose rod 62 with the advance tooth 65 can execute its action, which would lead to an error in the setting of zeros.

In order to avoid this, in a lateral arm of a bracket 48 (Figures 13 and 15) is rotatably mounted a bell crank lever 108 (Figure 10), the upward arm of which has a bent lug 109 against which presses the rod 62 of the escapement. The horizontal arm of the bell-crank lever 108 is situated under the bracket 48 and is held, by the pressure of the rod 62, which acts against the lug 109, above a hole of the bracket 48, which forms a guide for one end of a push rod 111. The other end of the rod 111 is jointed to the bar 24 (Figure 6). A torsion spring 112 (Figure 15) tends to bring the horizontal arm of the bell-crank lever 108 into the path of the push rod 111 when the rod 62 of the escapement is brought out of the position of rest.

When a key with several zeros is depressed, the push rod 111 will be moved under the horizontal arm of the lever 108, whilst the loose advance tooth 65 will be disengaged from the rack 22 and pushed forward with the rod 62 by the spring 63. As the lug 109 is thereby released, the horizontal arm of the bell-crank lever 108 will engage, under the action of the pressure of the spring 112, with the advanced end of the push rod 111, and drop away from the same when the key returns to the position of rest. It will be seen that in that way all the keys will be locked, as the bar 24 cannot be moved until the escapement has executed its full movement and the rod 62 has released again, by striking the lug 109, the path for the push rod 111 by raising the horizontal arm of the bell crank lever. The end of the said arm is bent in such a manner that the pressure of the push rod 111 is taken up by the arm of the guide bracket 48.

The machine is operated by means of levers. M is the main shaft operated by means of the crank handle H and N an intermediate shaft, both of which are mounted in the brackets O and P (Figures 1 and 2). To the shaft is rigidly secured a lever 120 which is connected to the rod 121 on the full stroke sector *h*. The upper arm of the sector *h* is connected by means of a rod 123 to a lever 122 secured to the shaft N, so that the movement of the hand lever H is transmitted through the said intermediate parts to the shaft N.

To the shaft N are rigidly secured levers 124, 125 and 126. The two former are intended for bringing back the sectors 31, and the lever 126 for controlling the counting gear.

It will be readily understood that the described advance lock or escapement for the stop carriage the means for setting and pushing back the stops or setting pins, the full strike key lock and the means for locking the keys when the escapement pawls are out of the position of rest can just as well be used in machines having instead of a travelling setting pin carriage a travelling guide bracket with push rods to set the pins, which are located in an immovable frame. It also is obvious that other details described in the

foregoing could also be utilized in other kinds of machines than adding machines with a single set of keys, visible writing and visible counting gears and therefore my application of the principles of the improvements is not limited to one kind only.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. In an adding machine with visible printing the combination of one set of keys, vertically movable type carriers and counting gears said carriers being coupled to the approximately horizontal arms of bellcrank levers controlling sectors driving the counting gears, the approximately vertical arms of said levers projecting upwards to such an extent that the counting gears can be mounted in a visible position.

2. In an adding machine with visible printing the combination of one set of keys, vertically movable type carriers, being coupled to the approximately horizontal arms of bell crank levers, said bell crank levers having saddle-shaped bends and being bent outwards, a pivot for the said bell crank levers and a cross bar bearing the said pivot and having lugs fitting into the saddle-shaped bends.

3. In an adding machine with visible printing the combination of one set of keys, vertically movable type carriers, being coupled to the approximately horizontal arms of bell crank levers, said bell crank levers having saddle-shaped bends and being bent outwards, a pivot of steel wire for the said bell crank levers and a cross bar bearing the said pivot and having lugs fitting into the saddle-shaped bends.

4. In an adding machine with visible printing the combination of one set of keys, vertically movable type carries, bell crank levers controlling quadrants, rods coupling the said type-carriers to the bell crank levers one end of which is slotted and a fixed plate for securing the coupling pin in the slot against sliding off.

5. In an adding machine with visible printing two or more parallel frames connected by spacers so as to form one lateral frame of the machine and carrying spindles pins and the like for receiving the movable parts of the machine, said spacers securing at the same time the lateral frame to the bed plate.

6. In an adding machine with visible printing the combination of one set of keys and separate keys for setting several zeros simultaneously, a laterally moving movable stop pin carriage and means for connecting the separate keys to each other and to the zero key in such a manner that on one of said separate keys being struck, in addition to the corresponding movable stop pin of the said carriage are also moved those of the keys for smaller travels and of the zero key.

7. In an adding machine with visible printing the combination of one set of keys and separate keys for setting several zeros simultaneously, a laterally moving movable stop pin carriage, a lock with a movable advance tooth for controlling the intermittent springing forward of the movable stop pin carriage and a rotatable stop lever which, on one of the separate keys being struck, is so moved that the stop corresponding to the separate key struck, is brought into the path of said advance tooth.

8. In an adding machine with visible printing the combination of one set of keys and separate keys for setting several zeros simultaneously, a laterally moving movable stop pin carriage, a lock with a movable advance tooth for controlling the intermittent springing forward of the movable stop pin carriage, a rotatable stop lever for the movable advance tooth and cam lever on one of the separate keys which engage over a pin on the stop lever and move the latter.

9. In an adding machine with visible printing the combination of one set of keys and separate keys for setting several zeros simultaneously, a laterally moving movable stop pin carriage, a lock with a movable advance tooth for controlling the intermittent springing forward of the movable stop pin carriage, a rotatable stop lever for the movable advance tooth and a toothed part cooperating with the loose advance tooth the last tooth of which being so widened that it forms a limit for the reach of said advance tooth.

10. In an adding machine with visible printing the combination of one set of keys and separate keys for setting several zeros simultaneously, a laterally moving movable stop pin carriage associated with the keys and a pivotable plate lying in the position of rest away from the path of the setting parts carriage and being turned against the advanced movable stop pin by the return of the carriage.

11. In an adding machine with visible printing the combination of one set of keys and separate keys for setting several zeros simultaneously, a laterally moving movable stop pin carriage associated with the keys, longitudinal slots in the walls of the setting parts carriage for receiving the movable stop pin, distance plates with notches and rods placed in the notches for guiding the movable stop pin laterally and preventing them from falling out.

12. In an adding machine with visible printing the combination of one set of keys and separate keys for setting several zeros simultaneously, a laterally moving movable stop pin carriage associated with the keys the

movable stop pin being arranged in rows, and a single spring for each row acting on all the movable stop pins of the said row and braking them.

13. In an adding machine with visible printing the combination of one set of keys and separate keys for setting several zeros simultaneously, a laterally moving movable stop pin carriage, type carriers associated with the keys, and stop or locking teeth for the type carriers provided on the movable stop pin carriage wall and releasing said type carriers by a lateral movement of the carriage during the adding and intermediate adding operations.

14. In an adding machine with visible printing the combination of one set of keys and separate keys for setting several zeros simultaneously, a laterally moving movable stop pin carriage a lock with a movable advance tooth for controlling the intermittent springing forward of the movable stop pin carriage and a lock for locking the keys against renewed depression during the movement of the said advance tooth.

15. In an adding machine with visible printing the combination of one set of keys and separate keys for setting several zeros, simultaneously, a laterally moving movable stop pin carriage a lock with a movable advance tooth for controlling the intermittent springing of the movable stop pin carriage, a rod carrying the lateral advance tooth, a second rod and a bar which is common to all the keys one arm of the said spring controlled bell crank lever engaging in front of the second rod connected to the said bar and locking the same.

In testimony whereof I affix my signature.

JOHN EMIL WILLIAM GREVE.