

Dec. 11, 1934.

A. ABEL

1,983,587

DEVICE FOR RECORDING CHECK VALUES AND MAINTAINING BALANCE

Filed Sept. 14, 1929

9 Sheets-Sheet 1

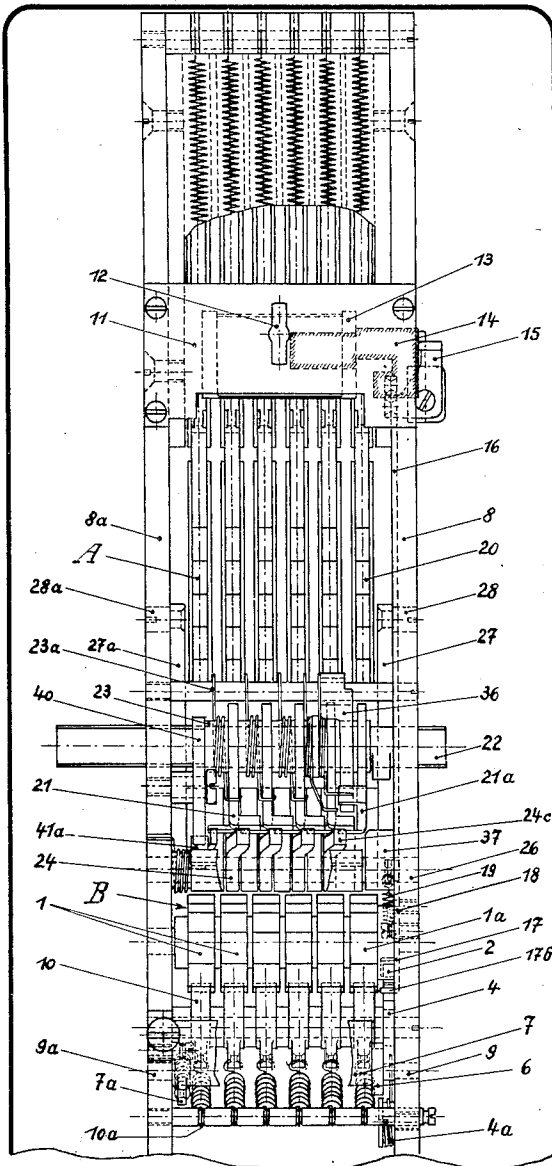


Fig. 1.

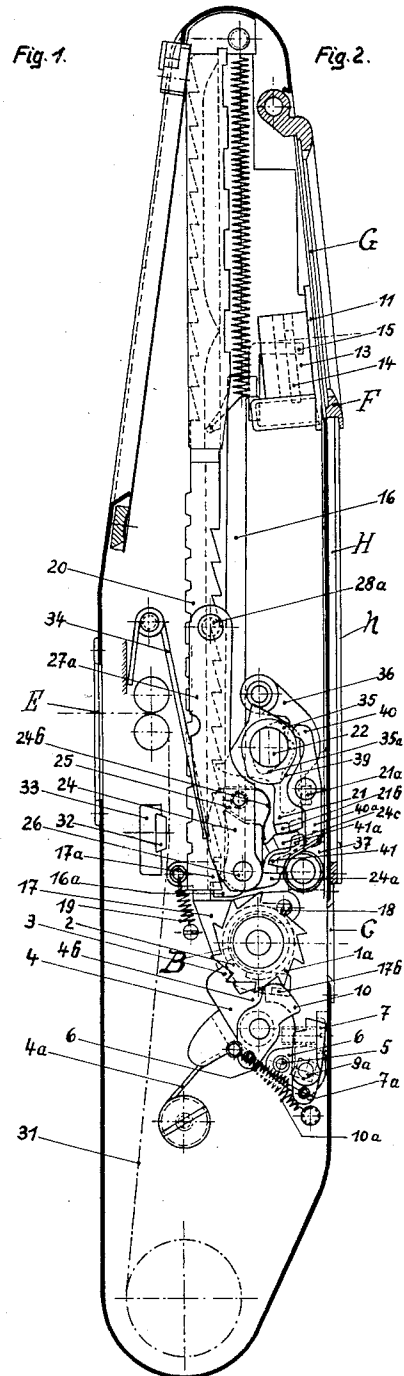


Fig. 2.

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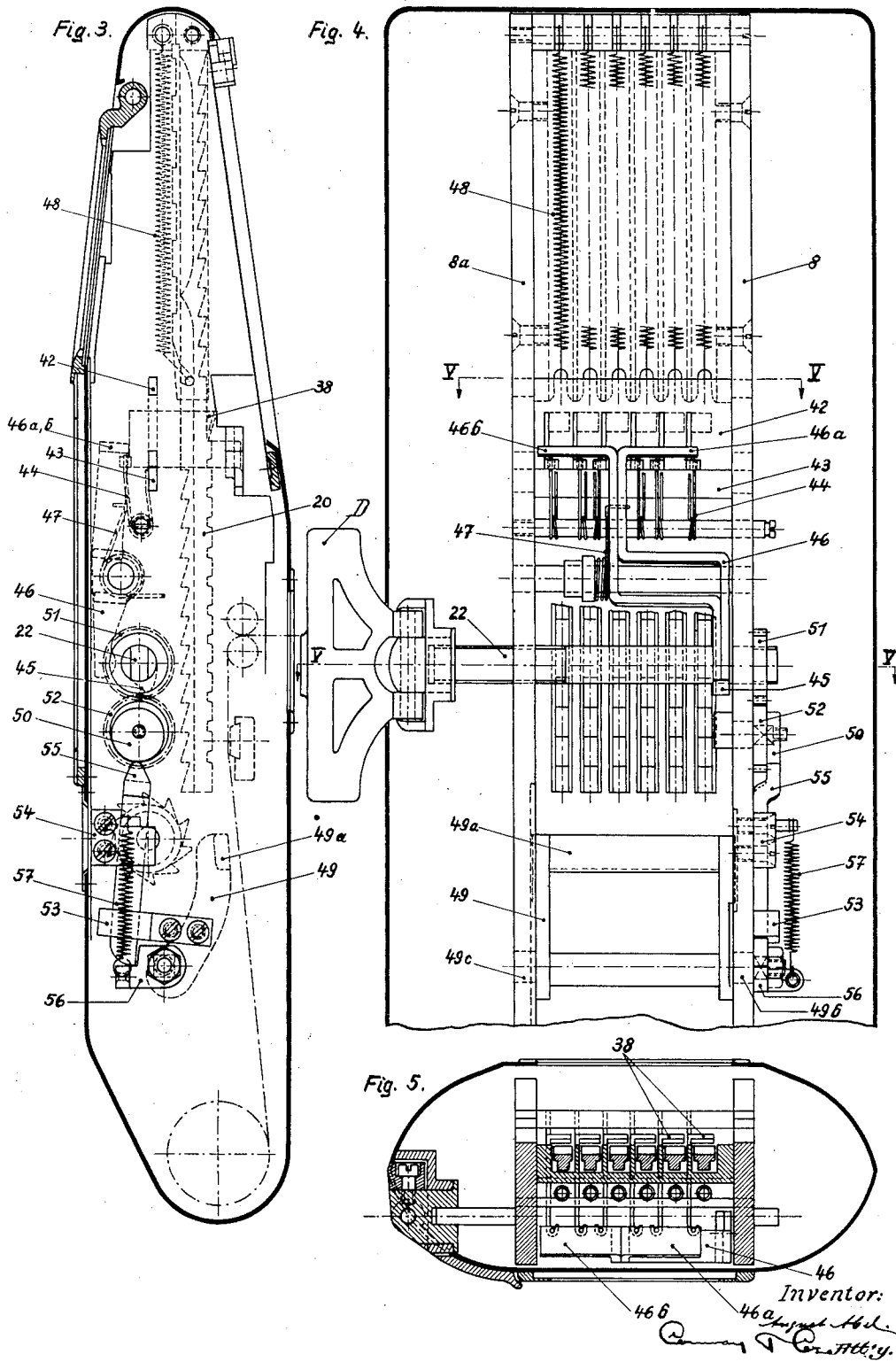
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9 Sheets-Sheet 2



Dec. 11, 1934.

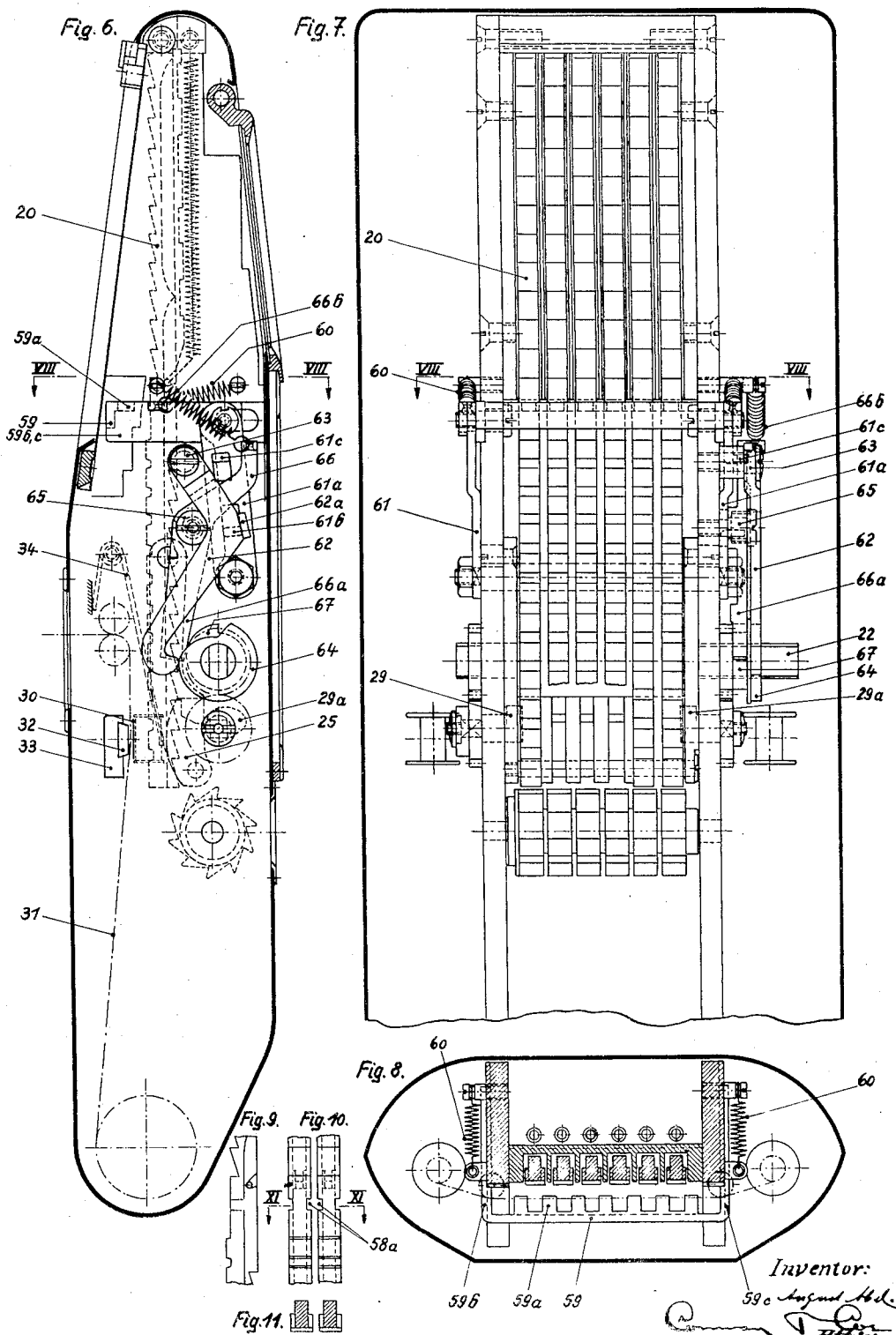
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1,983,587

DEVICE FOR RECORDING CHECK VALUES AND MAINTAINING BALANCE

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9 Sheets-Sheet 3



Dec. 11, 1934.

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1,983,587

DEVICE FOR RECORDING CHECK VALUES AND MAINTAINING BALANCE

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9 Sheets-Sheet 4

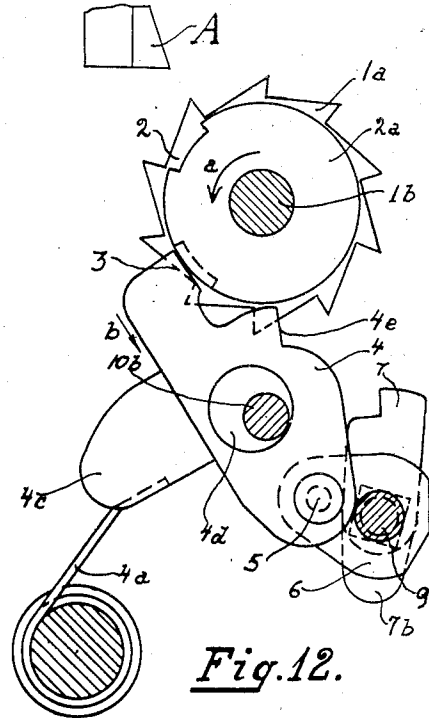
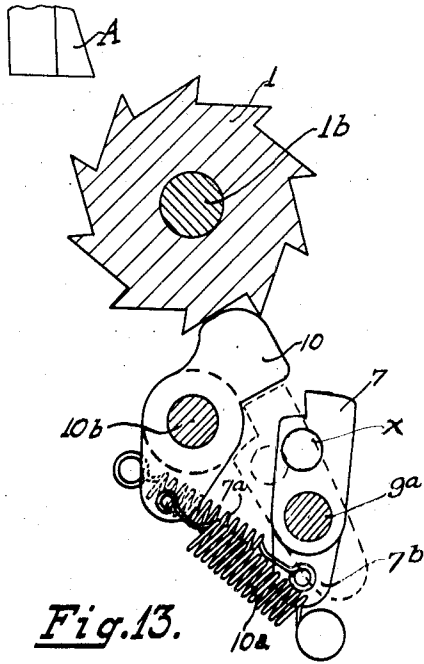


Fig. 30.

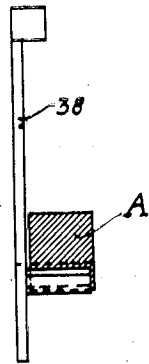


Fig. 17.

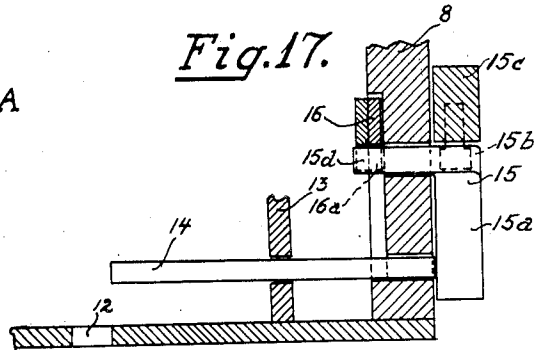
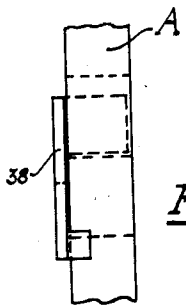


Fig. 29.



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1,983,587

DEVICE FOR RECORDING CHECK VALUES AND MAINTAINING BALANCE

Filed Sept. 14, 1929

9 Sheets-Sheet 5

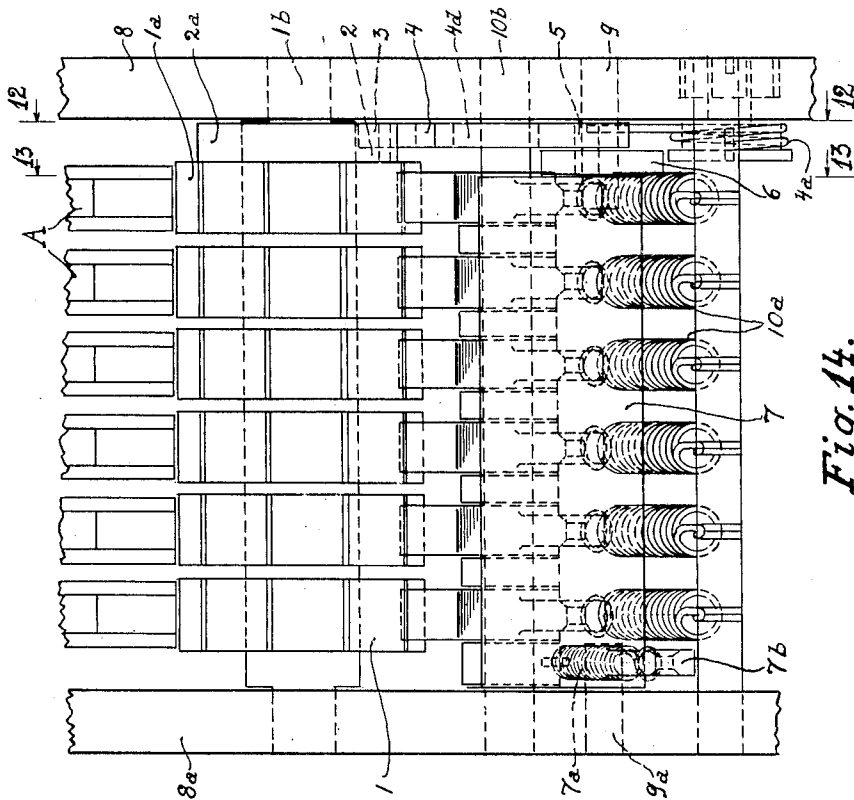


Fig. 14.

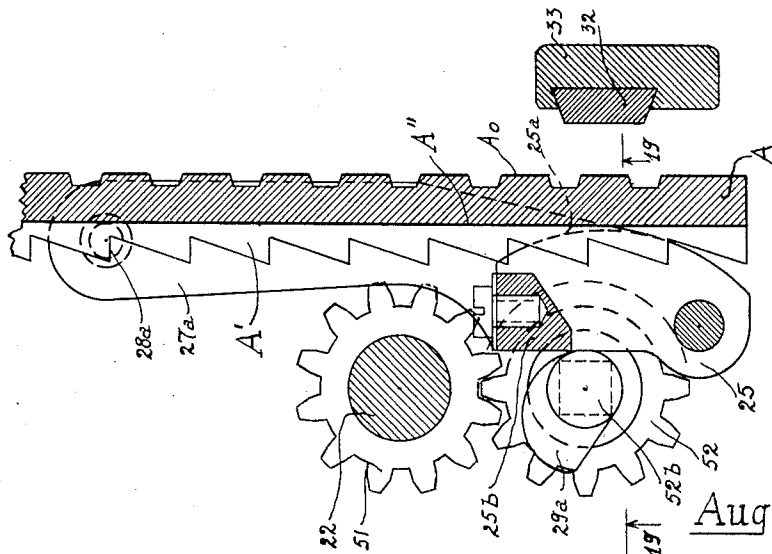


Fig. 18.

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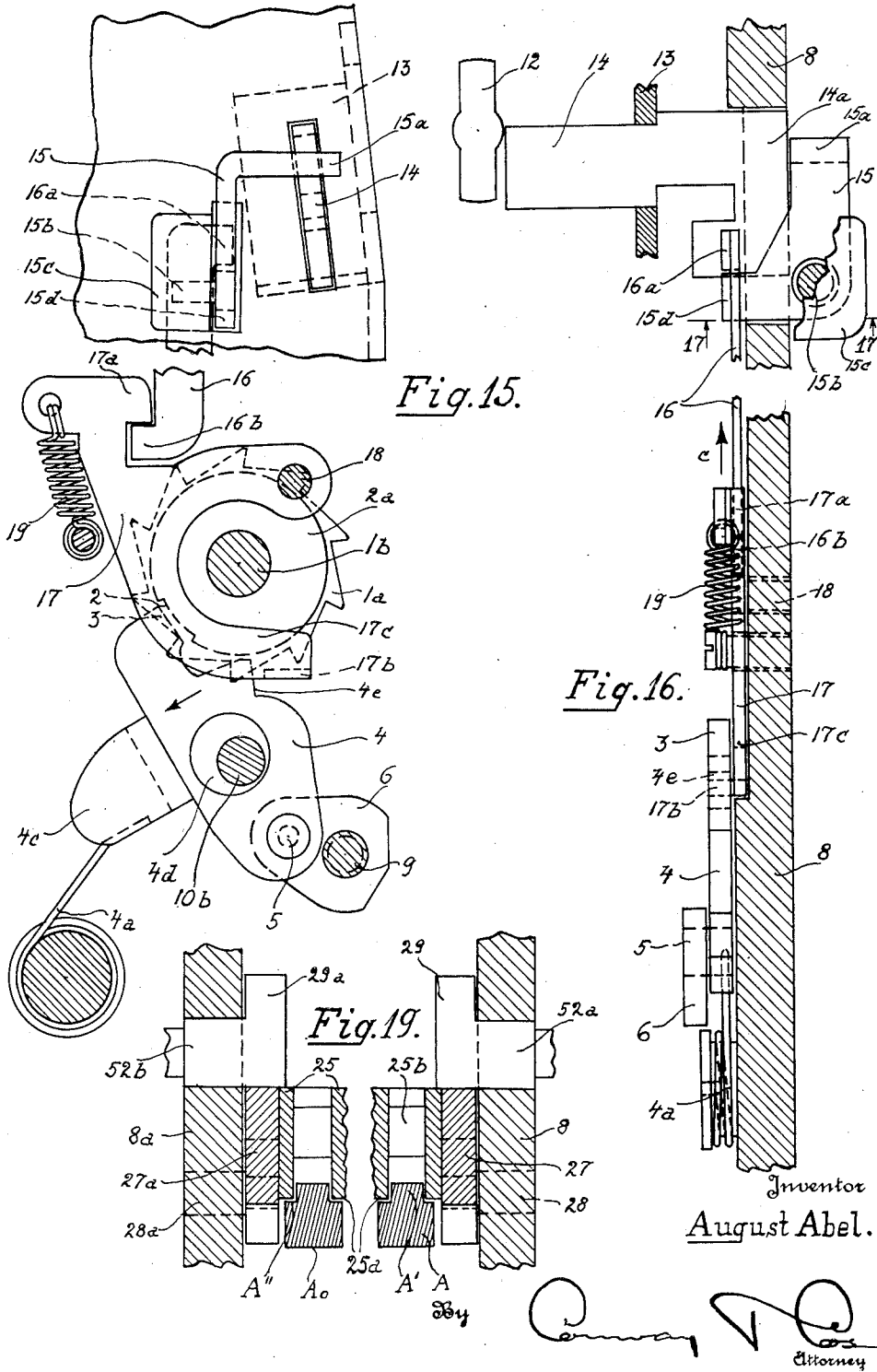
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1,983,587

DEVICE FOR RECORDING CHECK VALUES AND MAINTAINING BALANCE

Filed Sept. 14, 1929

9 Sheets-Sheet 6



Dec. 11, 1934.

A. ABEL

1,983,587

DEVICE FOR RECORDING CHECK VALUES AND MAINTAINING BALANCE

Filed Sept. 14, 1929

9 Sheets-Sheet 7

Fig. 20.

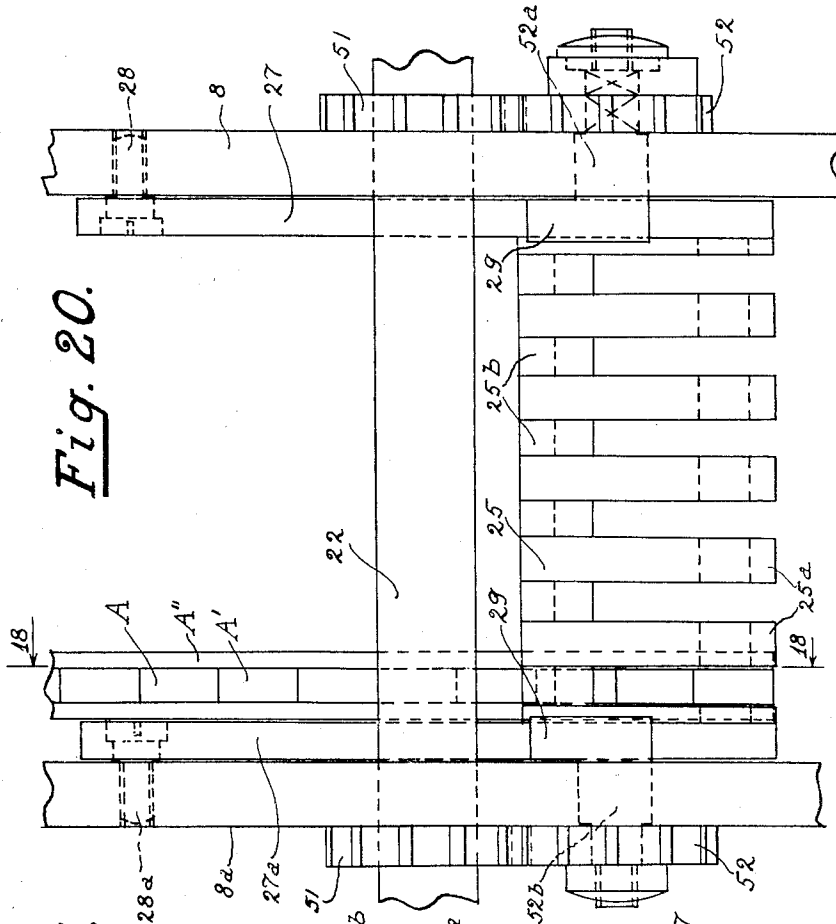
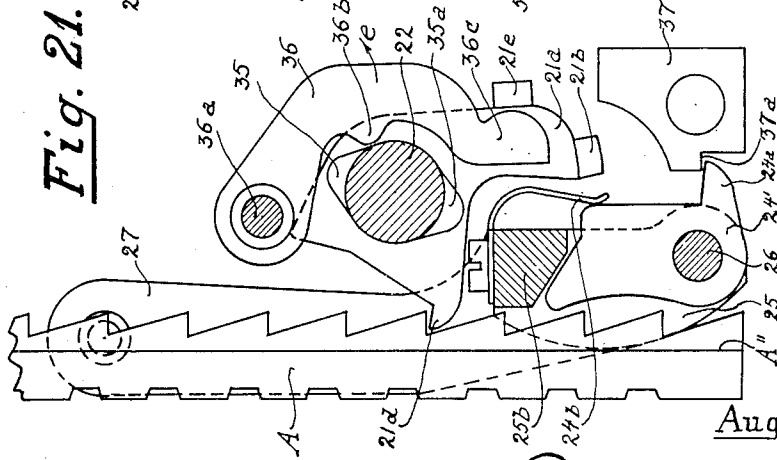


Fig. 21.



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1,983,587

DEVICE FOR RECORDING CHECK VALUES AND MAINTAINING BALANCE

Filed Sept. 14, 1929

9 Sheets-Sheet 8

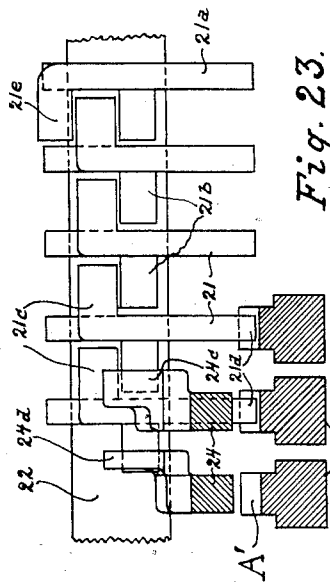


Fig. 23.

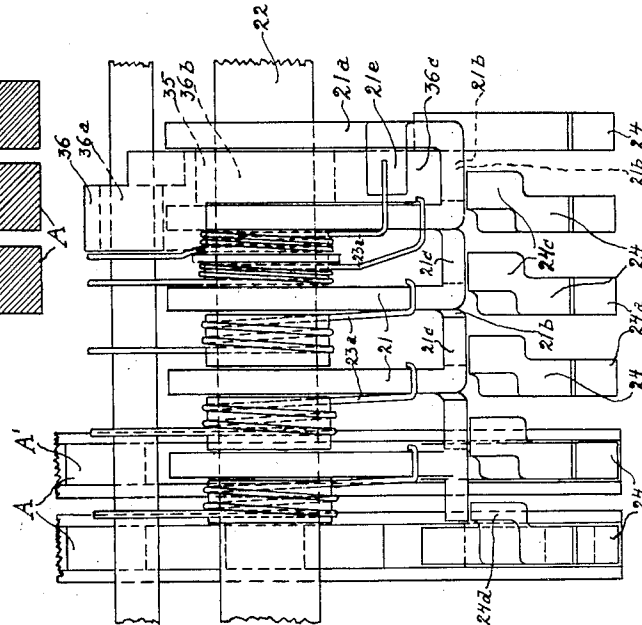


Fig. 24.

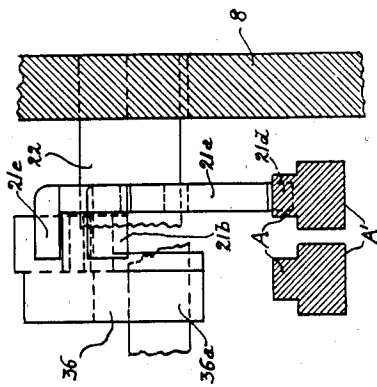


Fig. 25.

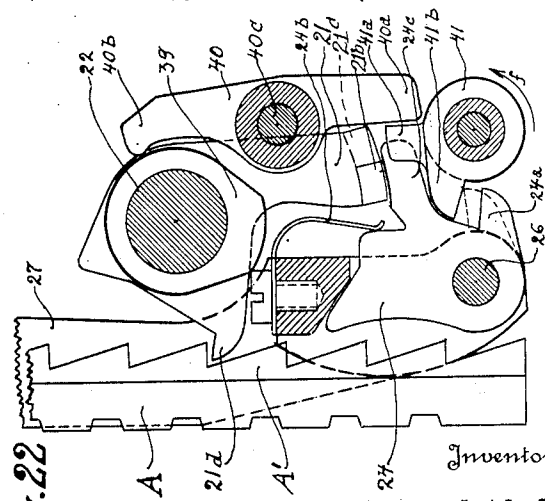


Fig. 22.

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884

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1,983,587

DEVICE FOR RECORDING CHECK VALUES AND MAINTAINING BALANCE

Filed Sept. 14, 1929

9 Sheets-Sheet 9

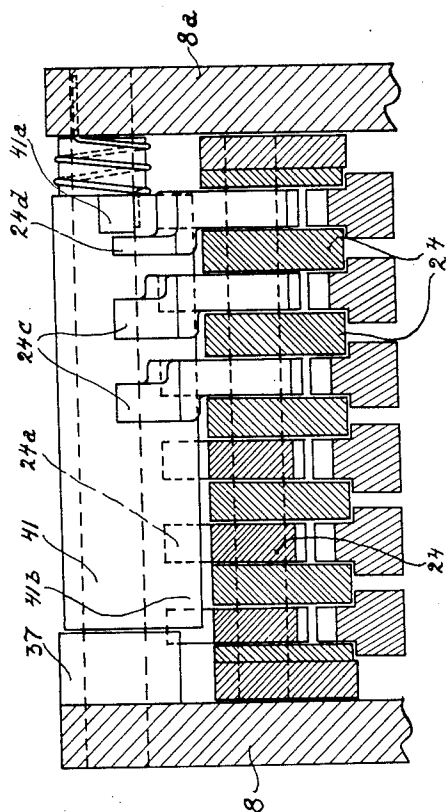


Fig. 28.

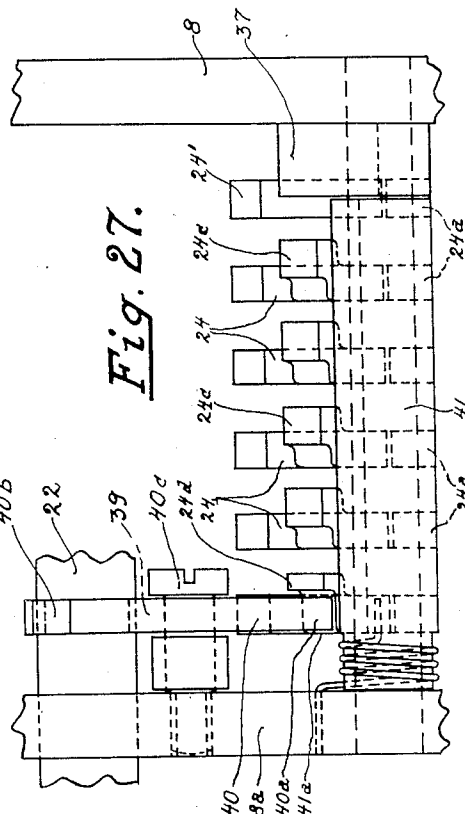


Fig. 27.

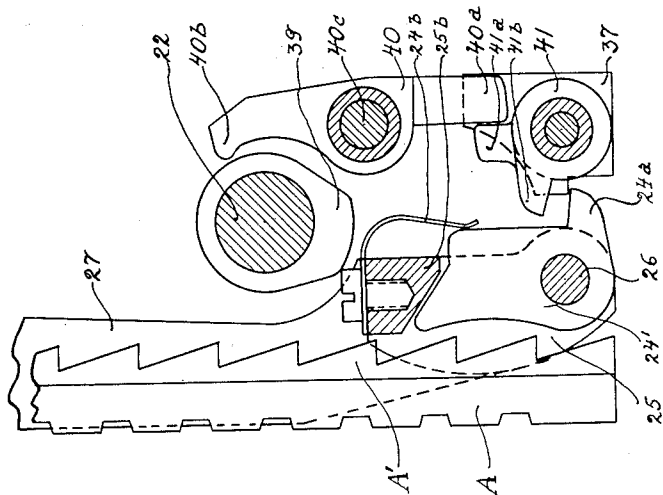


Fig. 26.

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UNITED STATES PATENT OFFICE

1,983,587

DEVICE FOR RECORDING CHECK VALUES
AND MAINTAINING BALANCE

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Application September 14, 1929, Serial No. 392,675

24 Claims. (Cl. 235—130)

This invention relates to a device which is intended to increase the security of payments rendered without the use of ready cash. It more particularly refers to an apparatus which, at all times, exactly records the state of the payer's banking account so that, when rendering payment by check, the receiver of such check might, at a glance, convince himself that the amount of the check is really covered by the payer's banking account and that he may thus safely accept it without hesitation. In other words, the apparatus serves to prevent the overdrawing of banking accounts.

However, the invention not only serves for the tender of check, but its main object is the provision of means to prevent tampering with the apparatus, and it further provides means to frustrate any feasible attempts at gaining access into the device or other fraudulent manipulation as may be attempted by artful handling or by the employment of mechanical means.

The device may thus be described as consisting of two distinct divisions, namely:

1. Means for the supply of a check or a check marker with the amount printed thereon,
2. Means for rendering impossible any fraudulent attempts at drafting checks, or printing check markers for a sum higher than the payer's banking account.

The said second division also includes means which prevent all possibilities of fraud either in that they cannot at all be carried out, or in that mechanisms come into action which frustrate any such attempts, or which automatically block the working parts against further use and thus give notice of a deception having been tried.

The first division includes arrangements and parts such as ratchet bars having printing numerals thereon acting on a subtracting totalizing mechanism, a printing device, an ink ribbon and feeding means therefor, and means for feeding and supplying the checks or the check markers. In the second division means are provided such as what I will term an "addition lock" which serve to prevent the printing of sums larger than the figure to which the totalizing mechanism is set; said addition lock, however, also having means which may be unlocked so as to enable fresh payments into the banking account being added to the balance, and a release for the shifting pawls of the tens-transporting means, blocking arrangements for a safety pawl device, for a setting pawl device, for the control of the lower

bar-lock and a rake, including means for locking the handle.

The arrangements enumerated in connection with the division first named will not be considered in this description. They are not new per se as similar devices are used in adding, calculating and registering machines. They do not, therefore, form any part of the invention and they are shown in the drawings only as far as they appear necessary for an intelligible understanding of the invention. However, the arrangements referred to in connection with the second division are entirely novel as far as I am informed in the art to which my invention pertains. But it is to be clearly understood, that they must of necessity all be contained within the apparatus and must work in mutually depending co-relation with each other. If only a single one of these arrangements were left out, the whole check register apparatus would at once be useless, and it is for this reason and for the dependence of the parts, that they must be regarded as one entirety in their combination as well as in their mode of operation. Any of these parts taken out of their co-operation and connection with the other arrangements or parts would be void of sense and entirely useless. Thus, although in this specification I have, for the sake of clearness, attended separately to each particular arrangement or group of parts, it must be understood, that they act all jointly as one inseparable entirety.

In the accompanying drawings my invention is shown by way of example; the various figures enumerated from 1 to 30 representing different views and sections of the device. Each figure, however, does not contain more than one or two of the aforesaid arrangements, as otherwise the drawings would become crowded and unintelligible for proper understanding. It is understood, of course, that all the various mechanisms shown in the different views are employed within one and the same apparatus.

In the drawings:

Fig. 1 is a top plan view of the overdraft lock, the totalizer pawl lock, the overdraft lock release, the rack bar lock, the printing rack bar lock, and the pawl restorer.

Fig. 2 is a side elevation of the same, one side wall of the frame being omitted.

Fig. 3 is a similar side elevation of the position pawls control and the safety bar.

Fig. 4 is a top plan view of the same.

Fig. 5 is a cross section on the line 5—5 of Fig. 4.

Fig. 6 is a side elevation of the printing mechanism and the rack bar return control.

Fig. 7 is a bottom plan view of the same.

Fig. 8 is a cross section on the line 8—8 of Fig. 7.

Fig. 9 is a detail side elevation of a portion of the rack bars with relation to the rack bar return control.

Fig. 10 is a top plan view of the corresponding portions of the two rack bars.

Fig. 11 is a cross section on the line 11—11 of Fig. 10.

Fig. 12 is a detail side elevation of the overdraft lock, substantially on the line 12—12 of Fig. 14.

Fig. 13 is a similar view of the totalizer pawl lock, substantially on the line 13—13 of Fig. 14.

Fig. 14 is a top plan view of the mechanisms of Figs. 12 and 13.

Fig. 15 is a side elevation of the overdraft lock release, a portion of the side frame member being removed.

Fig. 16 is a bottom plan view of the same.

Fig. 17 is an end view of the same, substantially on the line 17—17 of Fig. 16.

Fig. 18 is a vertical cross section through the printing mechanism on the line 18—18 of Fig. 20.

Fig. 19 is a cross section on the line 19—19 of Fig. 18.

Fig. 20 is a top plan view of Fig. 18.

Fig. 21 is a side elevation of a portion of the rack bar lock and printing rack bar lock, showing the highest order pawl and feeler.

Fig. 22 is a similar view, showing an intermediate order pawl and feeler, together with the pawl restorer.

Fig. 23 is an end view of the rack bar lock and printing rack bar lock shown in Figs. 21 and 22.

Fig. 24 is a top plan view of the same.

Fig. 25 is an end view of the printing rack bar lock.

Fig. 26 is a side elevation of the highest order pawl and the pawl restorer.

Fig. 27 is a top plan view of the pawl restorer.

Fig. 28 is an end view of the same.

Fig. 29 is a top plan view of one of the position control pawls.

Fig. 30 is an end view of the same.

As will be seen from Figs. 1 and 2 of these drawings, a number of ratchet bars A are shown, which are accessible from without and adapted to be shifted, as by means of a pin or the like, so that they may show either the amount of a check which the owner of the apparatus is just engaged to tender, or the amount which he has paid in at his bank and which, in this case, can only be set by the bank official entrusted with this kind of work, as will be apparent at a later stage of this specification. The said ratchet bars act upon a totalizer (Fig. 2) which is suitably arranged to work by subtraction only and the showing of which, always representing the state of its owner's banking account, may be observed at the observation window C. All functions of the apparatus are caused automatically by turning the collapsible handle D (Fig. 4) through one complete revolution. The check, or the check marker, with the required amount printed thereon, is finally issued at E. In the case of check markers being used, it is only necessary to detach the said marker and affix same to the check to be tendered.

At the keyhole 12, Fig. 1, there is provided a steel plate 11 and a hinged frame F (Fig. 2). Between these two parts a paper seal G is arranged,

which is preferably of a kind of paper difficult to imitate, and which has to be destroyed before the bank official entrusted with the setting of the mechanism is able to gain access to the mechanism by means of a key in order either to add to the totalizer a sum which may have been paid in at the bank by the owner of the apparatus, or to exchange the ink ribbon, the roll of check markers, or for any other reason. Except that particular bank official, who is in possession of the key, neither the owner of the apparatus nor anybody else will be able to cause any alteration to the figures shown on the totalizer, except subtraction. At H, Fig. 2, a space is preferably provided for the application of a photograph of the owner of the apparatus, which photo may also bear his signature and the number of the check register device, and which is preferably covered up by a pane of glass or transparent celluloid.

However, all the devices just enumerated do not form part of the invention and are intended merely to serve the purpose of describing the kind of apparatus to which my invention pertains, and its manipulation. The invention itself rests entirely in the arrangement and combination of the parts referred to in connection with division 2 as mentioned above, and which collectively form one single, self-contained mechanism which will now be described with reference to the accompanying drawings.

Overdraft lock

In order to prevent the showing of the balance of a banking account as indicated by the check register being increased, inadvertently or purposely with the object of fraud, which in itself would be possible by exceeding the zero position of the totalizer, an overdraft lock is provided in connection with the subtraction mechanism which ordinarily prevents subtraction through the zero position, but which may be released by the authorized bank official as by means of a key or the like, whenever an increase in the amount on the totalizer is required. In this case only is it possible to increase the showing on the totalizer by subtracting through the zero position of the same. This is done after the release of the addition lock and the opening of the mechanism as by means of a key introduced into the keyhole, in a manner described below.

In the following discussion, the left hand side of Figs. 2 and 6 and the right hand side of Fig. 3 are treated as the bottom or back of the machine. The term "depress" therefore means to move towards this bottom or back.

The totalizer is composed of a number of numeral wheels 1 carried on a shaft 1b mounted in the frame members 8, 8a. In the present case six numeral wheels are shown. Between these wheels any well known type of tens carrying or transfer mechanism may be used, although I prefer to use a type in which pawls act as the transferring members. Inasmuch as the device works only by subtraction, no double carrying arrangement is necessary. As an example, the type of transfer mechanism shown in the patent to Landin, No. 482,312, may be used. As the "fugitive one" is allowed for in the calculations made by the bank in crediting a deposit, and as the device otherwise never subtracts through zero, no special provision for it is necessary.

If an attempt is made to overdraw the account, that is, to subtract from the totalizer more than is shown thereon, by moving any one of the rack

bars A, it is obvious that the carrying mechanism will tend to cause the highest order wheel to move from 0 to 9. In order to prevent an overdraft, it is only necessary to prevent this wheel from turning from 0 to 9. A means is therefore provided which comes into action whenever the highest order wheel reaches 0 to lock it against further movement. This arrangement is shown in detail in Figs. 12 and 14.

The highest order numeral wheel 1a carries at one side a collar 2a rigid therewith. This collar is provided with a slot or notch 2. A substantially triangular lever 6 is pivotally supported by a shaft 9 mounted in the frame member 8. A lever 4 is pivoted at 5 on the lever 6. The lever 4 has a nose 3 which normally engages the periphery of the collar 2a and is pressed against the collar by a spring 4a acting on the projection 4c of the lever. The slot 2 is arranged near that tooth surface which carries the numeral 4, so that, when the wheel 1a reaches zero, as seen through the window G, the slot 2 reaches the broken line position (Fig. 12) and the nose 3 will drop into the slot. As the movement of the lever 6 is very limited, and as movement of lever 4 will be caused by any attempt to turn the wheel from 0 to 9, such movement will be transmitted to the lever 6 and will be so limited in amount that the wheel cannot be turned. In this way an overdraft is prevented, and any check which is written must be represented by a corresponding amount in the account of the drawer.

Totalizer pawl lock

If an attempt were made to overdraw the totalizer by breaking the above described lock by a strong pressure on the rack bars, the rather delicate pawls of the tens carrying mechanism might break or at least be damaged. I therefore provide means to lock all the numeral wheels individually when any attempt is made to overdraw, so that there is no further strain on the pawls of the carrying mechanism. In other words, if pressure is applied to the third order bar to force an overdraft, I do not rely only on the lock above described to resist this forcing action through the carrying pawls of the third, fourth and fifth orders. Instead, I cause the first movement in an attempted overdraft to lock each of the numeral wheels individually against further movement. Figs. 12, 13 and 14 disclose how I accomplish this.

For each totalizer wheel a pawl 10 is provided, mounted on a shaft 10b carried by members 8, 8a. There pawls are normally held by springs 10a against the wheels, thus permitting the wheels to turn forward to subtract but preventing any reverse movement, as shown. A lock bar 7 is rigidly mounted at one end on the lever 6 to turn therewith. This bar extends across the machine and is pivotally supported at 9a on the wall 8a, the pivots 9 and 9a being axially aligned. This width of the bar 7 is such that, if moved about its axis 9 to the position shown in broken lines in Fig. 13, it will block the pawls 10 so as to prevent them from disengaging the wheels and will thereby prevent rotation of the wheels 1.

The pivot 5 is offset from the pivots 9, 9a. If now the wheel 1a has reached zero, and the nose 3 has entered the slot 2, any attempt to overdraw will tend to turn the collar 2a in the direction of the arrow a (Fig. 12). Since nose 3 is in slot 2, one side of the slot will engage one side of the nose and this will push lever 4 in the

direction of arrow b. Since the pivot 5 is to the left of the pivot 9, the lever 6 will be turned counterclockwise (Fig. 12). This moves the bar 7 to lock all the pawls. In this way, the first effect of a forcible attempt to overdraw is a locking of each totalizer wheel to protect the carrying pawls.

A spring 7a connected to a projection 7b on the bar 7 and to the frame member 8a normally holds the bar lock 7 in non-locking position. It is to be noted that the lever 4 has a large opening 4d around the shaft 10b so that its movements are not blocked by this shaft.

Overdraft lock release

When the user of the device makes a deposit, it is necessary for the banker to add the amount of this deposit to the amount shown on the totalizer. Since the totalizer works only by subtraction, this cannot be done by direct addition. The banker first subtracts on paper or by another machine the amount to be deposited from one more than the highest number which can be shown on the totalizer. For example, in a six order totalizer, the highest amount which can be set is \$9,999.99. Suppose that the amount showing on the totalizer is \$1,342.67 and that the depositor wishes to place to his account \$4,296.24. The result should be \$5,638.91. The banker subtracts \$4,296.24 from \$10,000.00 (1 more than \$9,999.99) and obtains \$5,703.76. The overdraft lock is released in the manner to be described below and this amount is subtracted from the amount (\$1,342.67) showing on the totalizer giving the result \$5,638.91. Since the banker adds 1 to the amount which can be shown on the totalizer, any problem of the "fugitive one" is avoided and no allowance for this factor need be made in the machine. The device for thus releasing the overdraft lock is shown in Figs. 15, 16 and 17.

A key is inserted in the keyhole 12 provided in the plate 11. One of the wards of this key strikes a member 14 slidably laterally of the machine and guided in one wall of the lock case 13 and in the side member 8. The other end 14a of the member 14 strikes the cranked portion 15a of a bell crank lever 15 pivoted at 15b on a suitable fixed block 15c. The other arm 15d of this lever engages under a hook portion 16a of a member 16 slidable longitudinally along the side frame member 8. Movement of the slide 14 thus operates to draw the member 16 in the direction of the arrow c (Fig. 16).

The other end of the sliding member 16 carries an oppositely directed hook portion 16b. A lever 17 is pivoted at 18 on the side frame member 8. This lever has an extension which carries a hook member 17a cooperating with the hook 16b. A spring 19 is also secured to this extension and tends to draw the lever in a counterclockwise direction (Fig. 15). Movement of the slide member 16 thus draws the lever 17 in a clockwise direction against the action of the spring 19.

Another arm 17c of the lever 17 extends around the shaft 15 to a position by the side of a portion of the lever 4. This arm carries an offset portion 17b which is aligned with a shoulder 4e on the lever 4.

When the key moves the slide 14, the lever 15 is turned and draws the slide member 16, thereby turning the lever 17 clockwise. The projection 17b strikes the shoulder 4e and moves the lever 4 in the direction of the arrow d (Fig. 15), to such an extent that its nose 3 no longer rests on the periphery of the collar 2a. The wheel 1a may

now be moved to zero and from zero to 9 without being locked since the nose 3 cannot engage in the slot 2. The banker is thus able to subtract through zero and thereby in effect to add the amount of the deposit to the totalizer. As soon as the key is removed, the spring 19 returns the lever 17 to its normal position in which it does not interfere with the locking operation of the lever 4.

10

Printing mechanism

Means must of course be provided to depress or move the rack bars so that the printing types *Ao* on their lower sides will print the amount of the check. The arrangement for causing the downward movement of the rack bars to print is shown in Figs. 18 to 20.

Arms 27 and 27a are pivoted at 28 and 28a to the frame members 8, 8a. At their opposite ends these arms carry the printing or press bar 25. The rack bars *A* comprise a toothed portion *A'* and shoulders *A''* on each side of said toothed portion. The press bar 25 has portions 25a having curved surfaces which engage the shoulders *A''*. In alignment with the toothed portion *A'*, a greater portion of the press bar is cut away, leaving a space to receive the pawls to be described below. Only a small portion 25b is retained so that the press bar will move as a unitary whole. The portions 25a and 25b alternate across the width of the machine, leaving a pawl receiving space opposite each rack bar. It is evident that movement of the press bar 25 around its pivots 28, 28a will result in movement of the rack bars *A* against the platen 32 mounted in the frame 33 so as to print the amount of the check with the aid of the ribbon 30.

In order to cause this movement of the press bars, the main shaft 22 through gears 51, 52 rotates shafts 52a, 52b. Rigidly mounted upon these shafts are cams 29, 29a. These cams engage the side of the press bars 25 opposite the rack bars. It is evident that rotation of the main shaft will turn these cams and will thereby move the press bar to cause the rack bars to print.

45

Rack bar lock

The devices described above are sufficient to prevent any unauthorized overdraft. However, there are a number of ways in which it might be possible for a person to print a check without subtracting from the totalizer the amount of this check, or to print a check for an amount greater than the amount subtracted from the totalizer. A series of locking devices are provided in order to prevent such unauthorized operation.

In the first place, when for instance the third order rack bar moves its totalizer wheel from zero to 9, the tens carrying mechanism automatically moves the totalizer wheel of the fourth order back through one space. If, while making this subtraction in the third order and causing a one space movement in the fourth order, the fourth order rack were pushed forward through one space, then the movement of the third order bar and the single space movement of the fourth order wheel through only a single space. For instance, if the amount in the totalizer were \$22.00 and the third order bar is pushed forward to subtract \$8.00, the fourth order numeral wheel will automatically be turned from 2 to 1. If, as the third order wheel turns from zero to 9, and the fourth order wheel turns therewith from 2 to 1, the fourth order rack bar should be pushed forward

one space, then the fourth order wheel would be turned back only one space. The check printed by the device will call for \$18.00 although only \$8.00 would have been subtracted from the amount on the totalizer. In this manner it would be possible in a single transaction to draw a check which, in each order except the lowest, would be for an amount one greater than the amount withdrawn from the totalizer. In the present device, a dishonest withdrawal of \$1,111.10 could thus be accomplished. The device for preventing such operation of the machine is shown in Figs. 21 to 24.

Rotatably mounted on the main shaft 22 are a plurality of feelers 21, the feeler of highest order being given the designation 21a. As will be understood from the description of the purpose of these feelers, no feeler is provided for the lowest order rack bar. Each of these feelers has a nose 21d which extends into the path of the teeth of the rack bar so that the slightest movement of the rack bar to turn the totalizer wheels will rotate the feelers about the axis 22. Springs 23a normally urge the feelers against rotation in the direction in which they are moved by the rack bars. These springs rest on the bodies of the feelers, except that on the feeler of highest order the spring engages a lug 21e to be described below. The other ends of the feelers, except the highest order feeler, have oppositely laterally extending portions 21b and 21c as shown in Fig. 23, the portions 21c being arranged higher on the feelers than the portions 21b. The feelers are arranged so that the portion 21b of each feeler underlies the portion 21c of the next lower feeler. The highest order feeler 21a is also provided with a portion 21b which underlies the portion 21c of the fifth order feeler. It is evident herefrom that movement of any feeler in the upward direction (Fig. 23) caused by movement of a rack bar will result in similar movement of all feelers of lower orders, since the portions 21b will raise successively the portion 21c of the lower order feelers. Feelers of higher order will not be disturbed.

A plurality of pawls 24 are mounted on an axis 26 in the spaces above mentioned in the press bar 25 in alignment with the toothed portion of the rack. Springs 24b are secured to the portions 25b of the press bar and engage the sides of these pawls opposite the rack bars so as to urge the pawls in the direction of the rack bars. The pawls of all except the highest and lowest orders have projections 24c which extend into alignment with the portions 21b, 21c of the feelers. These projections rest against the feelers (Fig. 22) and the presence of the feelers prevents the springs 24b from pressing the pawls into engagement with the rack bars. The projections are offset from the planes of the pawls in the direction of the highest order of the totalizer. For instance, the projection 24c of the second order pawl will extend over far enough to rest against the projection 21b of the third order feeler (Fig. 23). The lowest order pawl likewise has a projection 24d, offset far enough to engage the portion 21b of the second order feeler. This projection is much thinner than the projections 24c on the other pawls for a reason to be explained below. In fact, the projection is offset so far and is so thin as to be entirely out of vertical alignment with any portion of the body of the pawl (Fig. 23).

Now suppose that the second order bar is pushed forward. The rotation of the feeler will raise the portion 21b out of the path of the portion 24d of the lowest order pawl and this lowest

order pawl will drop and will lock the bar of lowest order. Again, taking the example given above, in which an attempt was made to subtract \$8.00 from \$22.00 and to print a check for \$18.00, the result would be as follows. The third order bar would be pushed forward until it began to turn the totalizer wheel from zero to 9, that is, it would be pushed forward slightly over two spaces. When the totalizer wheel begins to turn from zero to 9, an attempt is made to push forward the fourth order rack bar one space so that the rotation of the fourth order wheel caused by this movement and by the carrying mechanism from the third order wheel will coincide. As soon as the fourth order rack bar begins to move forward, the fourth order feeler is turned and raises the projection 21b out of the path of the projection 24c of the third order pawl. The third order pawl immediately drops under the action of the spring 24b and any further movement of the third order rack bar is prevented until the third order pawl is restored to its original position after the check is printed by a mechanism to be described below. The movement of the fourth order rack bar, since the movement of the fourth order feeler moves all lower feelers, will at the same time lock all lower rack bars. Movement of the sixth or highest order feeler will have the same effect in simultaneously locking all lower rack bars. Since there is no rack bar lower than the first, no feeler need be provided for the lowest order. Since there is no rack bar higher than the sixth, there is no feeler which would release the sixth order pawl and no projection 24c need be provided on this pawl. The purpose of the sixth order pawl is dependent on the action of the feelers and will be explained below.

It is evident that by the above arrangement the applicant makes it necessary to move the bars in order from the lowest to the highest and prevents the possibility of a fraudulent operation of the machine in the manner described above.

Printing rack bar lock

When the machine begins to print, it is desirable to lock all of the rack bars so that the bars cannot be pushed forward after they disengage the totalizer wheels. In other words, a person operating the device might start to depress the rack bars to print, and, after the bars have been disengaged from the totalizer wheels, would be able to push the bars forward and thus to print a check for a greater amount than had been subtracted from the totalizer. To prevent this, means are provided to lock all of the rack bars as soon as the main shaft begins to turn to depress the press bar and cause the rack bars to print the check. The arrangement for thus causing the locking of all the bars makes use of the rack bar locking mechanism described above, including the pawls and the feelers. This arrangement is shown in Figs. 21, 23, 24, 25 and 26.

Referring to Figs. 21, 23 and 25, the highest order feeler, in addition to its portion 21b, is provided with a projection 21e located above and nearer the main shaft than the element 21b. A cam 35 is mounted on the main shaft 22. A lever 36 is pivoted at 36a and has a portion 36b in the path of the cam 35. The free end 36c of this lever engages the element 21e of the highest order feeler 21a. When the user begins to turn the main shaft to cause the device to print the check, the cam 35 moves the lever 36 in the direction of the arrow e (Fig. 21) and thereby moves

the feeler in the same direction as if the highest order rack bar had been moved. As was explained above, such movement of the feeler will lock the rack bars of all lower orders. This leaves only the highest order rack bar unlocked.

Each of the pawls 24 has on the same side as the projection 24c a second projection 24a the purpose of which will be described below. The highest order pawl 24' has a similar projection. This projection engages behind a shoulder 37a on a block 37 mounted on the frame member 8. When the press bar begins to move the rack bars to printing position, the projection 24a of the pawl 24' slips out from behind the shoulder 37a, since the pawl moves with the press bar away from the block 37. When the press bar has moved a very short distance, the pawl is thus released and under the action of its spring 24b engages the rack bar of the highest order. In this way, all of the rack bars are locked before the press bar has moved them far enough to disengage the totalizer wheels.

It will be noted that the projection 24a only partially lies behind the shoulder of the block 37, and that a portion of this projection extends to one side of the block. The purpose of this will be explained below.

Pawl restorer

After the pawls have dropped into position to engage the rack bars, and the rack bars have moved to print the feelers 21 under the action of their springs will be returned to the normal position shown in Fig. 23. It is obvious that upon return movement of the press bar the projections 24c would strike against the projections 21b of the feelers unless some means were provided to move the pawls back to a position in which they can rest against the faces of the feelers. The mechanism for restoring the pawls to their normal position is shown in Figs. 22, 26, 27 and 28.

All the pawls except those of the highest and lowest orders are alike and a description of one will explain the operation of all. The pawl restorer 41 is a cylinder which projects substantially across the machine, ending at the block 37. This element has a shoulder 41b extending across its full length. The shoulder, as shown in Fig. 22, is located close to the projections 24a of the pawls. When the pawls have dropped to engage the rack bars, these projections 24a assume the broken line position shown in Fig. 22. It is clear that if the restoring member 41 is now moved in the direction of the arrow f (Fig. 22), the pawls will be raised against the action of their springs to a position in which they will disengage the rack bars.

At the side of the lowest order rack bar, the member 41 has a lug 41a. This lug extends out over a portion of the lowest order pawl, and the projection 24c of the lowest order pawl is offset completely in order to leave a space for the movement of this lug. A lever 40 is pivoted at 40c on the frame element 8a. One end 40a of this lever engages the lug 41a. The other end 40b engages a cam 39 mounted on the main shaft 22. As the main shaft turns, the cam 39 moves the lever 40 and thereby turns the member 41 to bring the pawls to the full line position in which they are shown in Fig. 22. As the press bar now returns to its normal position and carries the pawls with it, the projections 24c do not strike the feelers but return to their original position in which they rest against the faces of the feelers.

The lowest order pawl is restored to its position

in the same manner, the only difference between this and the other pawls being the thin projection 24c provided to allow room for the lug 41a and lever 40. The highest order pawl, although it has no projection 24c, must be restored to such a position that it can move up behind the shoulder 37a. As shown in Figs. 26 and 28, the projection of shoulder 41b engages a portion of the projection 24a of this pawl which projects from one side of the block 37 and returns it to disengaging position, so that when the press bar moves back to its initial position the projection 24a will move up behind the shoulder 37a. In this way, by a full rotation of the main shaft, all the parts of the mechanism will be returned to their positions and the rack bars will be released for a new operation.

During the return movement of the press bar and the restoring of the pawls, a portion 35a on cam 35 (Fig. 21) through the lever 36 raises all the feelers so that there is no danger of their being struck by the pawl projections 24c. After the pawls are raised with the press bars, the feeler portions 21b, 21c move down into the path of the projections 24c. The pawl restorer is now released and the pawls rest against the feelers until the machine is again operated.

Figs. 3, 4 and 5 illustrate the "position pawls control" and the mechanism of the lower safety bar. The position pawls 38 (Figs. 29 and 30), as the name implies, serve to arrest the ratchet bars in the position they have been set. They are slidably arranged in the upper comb-shaped guide 42 and the lower guide 43 and are adapted to be drawn against the ratchet bars by means of the tension springs 44. Both guides 42 and 43 are laterally fixed in the frames 8 and 8a. The position pawls are actuated by special control means which include a cam 45 on the main shaft 22, which cam acts upon a lever 46, the upper ends 46a and 46b of which are bent to divert outwardly to both sides so as to reach over all the position pawls. The tension spring 47 always endeavours to draw the upper part 46a and 46b of the lever 46 towards the back, i. e., away from the position pawls. The operation of this mechanism consists in forcing the position pawls 38 out of the teeth of the ratchet bars 20 during the continued rotation of the main control shaft by means of the cam 45 and lever 46 against the action of spring 47 and the position pawl springs 44, as soon as the ratchet bars, after printing, have been sufficiently lowered by the action of the press bar 25, 25a which is moved by the cams 29, 29a, as to be prevented from taking the ink ribbon with them when springing back. The said ratchet bars are then able to return to zero under the action of their springs 48.

The means employed for the control of the safety bar serve to prevent an attempted fraud of the following kind: Without this safety bar it would be possible, as by pushing a thin wire or a steel blade under the ratchet bars, to lift these bars to such an extent that they could be moved over the teeth of the indicator wheels without engaging them. In such way it would be quite possible to print a sum onto a check or a check marker, without causing the same to be registered and it will be clearly apparent that this will be the case when the ratchet bars can be made to slip over the counting mechanism, without actuating same. In order to prevent any attempt of this kind, a bar 49a is arranged upon a frame 49 in the height of the indicator wheels,

i. e., above the position of the ratchet bars, which bar 49a extends over the whole width of the subtraction mechanism and is pivoted with the arms of its frame on pins 49b and 49c in the partitions 8 and 8a. The said bar is oscillated by the action of a cam 50 which is actuated by the pinions 51 and 52. It acts over a short lever 56 upon the safety bar 49a against the tension of spring 57, said action being initiated by means of the rods 55 which are moved in the straight guides 53 and 54. The control cam 50 is shaped so that it regulates within one revolution of the main shaft the distance of the printing type on the ratchet bars as regards time and lift in the following manner. In the initial position of the ratchet bars before printing, the printing type is spaced above the safety bar a short distance, and the rack bars will strike the safety bar before they can be turned or swung down far enough to be moved out of engagement with the totalizer wheels. When the rack bars begin to move down to print, the safety bar is also moved down so that it is always slightly ahead of the rack bars, which are now locked by the printing rack bar lock described above. The rack bars thus never strike the safety bar in the normal operation of the machine. After the rack bars have printed the check, the press bar permits them to move back to engage the totalizer wheels. If the safety bar moved up as fast as the rack bars, the rack bars could not return to their zero positions since they could not disengage the teeth of the totalizer wheels. For this reason, the safety bar dwells in its depressed position after printing, and only moves back to its initial position after the rack bars have returned to their zero positions. That is to say, the safety bar is moved when the ratchet bars are moved, so that the bars never strike the safety bar. However, the safety bar is very close to the ratchet bars in all positions, so that any attempt to move the ratchet bars out of their regular path is prevented, since the safety bar blocks such movement. Thus it is impossible to move the ratchet bars inactively over the wheels of the subtraction mechanism by the assistance of the means above referred to. On the other hand, neither any hinderance is occasioned in the return of the ratchet bars into their zero position.

The control of the rake bar and the locking of the handle serves the purpose of frustrating such attempt at fraud, in which the person carrying out such attempt, after having set the mechanism to some high figure, tries to prevent the return of one or more of the bars of the higher order, by jamming, for example, a match between the bars in their drawn position and the upper abutments. This is rendered impossible by the fact that the handle cannot be returned through fully 360°, unless all the ratchet bars have been returned to zero. For this purpose all the ratchet bars are provided just below their uppermost teeth at their right and left with small recesses 58a (Fig. 10), into which recesses the pegs 59a of the rake bar 59 must enter in order completely to release the handle from its locked position. The rake bar 59 which is guided with its two lateral arms 59b and 59c, is placed under the action of two tension springs 60, tending constantly to draw the said rake bar in the direction of the ratchet bars. Rake bar levers 61 and 61a respectively are pivoted to the said arms 59b and 59c, the right hand side lever 61a having a bent-up lug 61b, against which a lug 62a of the

cam lever 62, pivoted at 63, is adapted to rest. At each revolution of the handle this one-arm lever 62 is permitted to move towards the main shaft 22, by a notch in the cam 64 under the assistance of the rake bar spring 60 and under the intermediate action of the right hand side lever 61a, whereby the pegs of the rake bar are moved into the lateral recesses 58a of the ratchet bars 20. At the last moment of the descent of the rake bar, the upper bent-up lug 61c of the lever 61a presses against the double-armed lock lever 66 which is pivoted on a pin 65. The lower arm 66a of the said lock lever is thereby removed from the nose of the locking cam 67, which is arranged on the shaft 22. After all the ratchet bars have returned into their zero positions, the pins of the rake bar are able to enter the lateral recesses 58a of the ratchet bars, from which they may subsequently again be withdrawn by the mechanism described. However, when one or more of the ratchet bars are prevented from springing back to zero, as by the introduction of some piece of material, the pin will be unable to descend, because those of the ratchet bars which have not returned, would prevent the said pegs entering into the recesses. In this way the handle is locked, because of the rake bar being unable to descend sufficiently as to cause the lower arm 66a of the locking lever 66 to come out of engagement with the disc 67. The said rake bar mechanism thus exercises a control during the turning of the handle, as to whether all of the ratchet bars properly return into their zero position, and it automatically locks the handle and, therewith, the entire apparatus, in case the just described manipulation should have been attempted.

What I claim is:—

1. In an overdraft preventing check marking device comprising a figure setting device, a totalizing subtraction mechanism including a number of indicator wheels, a printing device, means to hold a supply of printing paper, and means for delivering printed slips from said holding means, the provision in connection with the indicator wheel of highest order of locking means comprising a slot in said indicator wheel, a pivoted spring-controlled lock lever having a nose adapted to enter said slot when the numeral wheel of highest order is in its zero position, and means for unlocking said locking means, comprising a movable latch, a bell crank lever operated by said latch, a tie bar moved by said bell crank lever, a third lever operated by said tie bar and having a projection adapted to engage said lock lever to move said nose out of said slot.

2. In an overdraft preventing check marking device comprising a subtraction mechanism and a totalizer comprising a number of toothed indicator wheels, the provision in connection with the indicator wheel of highest order of means to prevent movement of said wheel past its zero position in a negative direction and means movable by pressure on said highest order wheel tending to move it past its zero position to lock the remaining wheels individually against movement.

3. In an overdraft preventing check marking device comprising a subtraction mechanism and a totalizer comprising a number of toothed indicator wheels, the provision in connection with the indicator wheel of highest order of means to prevent movement of said wheel past its zero position in a negative direction, pawls engaging the other indicator wheels, and means movable

by pressure on said highest order wheel tending to move it past its zero position to hold said pawls against the wheels so as to lock the wheels against movement.

4. In an overdraft preventing check marking device comprising a subtraction mechanism and a totalizer comprising a number of toothed indicator wheels, the provision in connection with the indicator wheel of highest order of means to prevent movement of said wheel past its zero position in a negative direction, comprising a lock lever engaging said highest order wheel, and means to lock the remaining wheels comprising pawls engaging said wheels and a bar movable against said pawls by pressure on the lock lever caused by attempted movement of said highest order wheel past its zero position.

5. In an overdraft preventing check marking device comprising a subtraction mechanism and a totalizer comprising a number of toothed indicator wheels, the provision in connection with the indicator wheel of highest order of means to prevent movement of said wheel past its zero position in a negative direction, comprising a lock lever engaging said highest order wheel, and means to lock the remaining wheels comprising pawls engaging said wheels, a pivoted crank, said lock lever being pivoted on said crank, and a bar carried by said crank, said lock lever turning said crank to move said bar against said pawls when an attempt is made to move said highest order wheel past its zero position.

6. In an overdraft preventing check marking device comprising a subtraction mechanism including a number of individually movable ratchet bars and a number of totalizer wheels operable by said ratchet bars, the provision of a main shaft, safety pawls in connection with said ratchet bars, feelers pivoted on said main shaft adapted to engage with teeth on said ratchet bars, means on said feelers normally engaging the pawls to hold them out of engagement with the ratchet bars, springs acting on said feelers, means on each feeler engaging the feeler of next lower order, whereby movement of any ratchet bar moves its feeler and thereby moves the feelers of all lower orders to disengage said pawls to enable them to engage the ratchet bars of the lower orders to lock the same against movement.

7. In an overdraft preventing check marking device comprising a subtraction mechanism including a number of individually movable ratchet bars and a number of totalizer wheels operable by said ratchet bars, the provision of a main shaft, safety pawls in connection with said ratchet bars, feelers pivoted on said main shaft adapted to engage with teeth on said ratchet bars, means on said feelers normally engaging the pawls to hold them out of engagement with the ratchet bars, springs acting on said feelers, projections on said feelers, a projection of each feeler engaging a projection of the feeler of next lower order, whereby movement of any ratchet bar moves its feeler and thereby moves the feelers of all lower orders to disengage said pawls to enable them to engage the ratchet bars of the lower orders to lock the same against movement.

8. In an overdraft preventing check marking device comprising a subtraction mechanism including a number of individually movable ratchet bars and a number of totalizer wheels operable by said ratchet bars, the provision of a main shaft, means to prevent simultaneous forward movement of more than one ratchet bar, and means to prevent forward movement of any of the ratchet bars during rotation of said shaft.

9. In an overdraft preventing check marking device comprising a subtraction mechanism including a number of individually movable ratchet bars and a number of totalizer wheels operable by said ratchet bars, the provision of a main shaft, means operated by the movement of any ratchet bar to lock the ratchet bars of all lower orders against forward movement, means operated by movement of said shaft to print a check, and means operated by movement of the shaft to lock all the ratchet bars against forward movement.

10. In an overdraft preventing check marking device comprising a subtraction mechanism including a number of individually movable ratchet bars and a number of totalizer wheels operable by said ratchet bars, the provision of a main shaft, locking means for each ratchet bar, means operated by the movement of any ratchet bar to operate the locking means of all lower ratchet bars to prevent forward movement thereof, and means operated by movement of said shaft to operate the locking means of the ratchet bar of highest order, whereby all said bars are locked.

11. In an overdraft preventing check marking device comprising a subtraction mechanism including a number of individually movable ratchet bars and a number of totalizer wheels operable by said ratchet bars, the provision of locking means for each ratchet bar, means operated by the movement of any ratchet bar to operate the locking means of all lower ratchet bars to prevent forward movement thereof, means to print a check, and means operated by the operation of said printing means to operate the locking means of the ratchet bar of highest order, whereby all said bars are locked.

12. In an overdraft preventing check marking device comprising a subtraction mechanism including a number of individually movable ratchet bars and a number of totalizer wheels operable by said ratchet bars, the provision of a main shaft, safety pawls in connection with said ratchet bars, feelers pivoted on said main shaft adapted to engage with teeth on said ratchet bars, means on said feelers normally engaging the pawls to hold them out of engagement with the ratchet bars, springs acting on said feelers, means on each feeler engaging the feeler of next lower order, whereby movement of any ratchet bar moves its feeler and thereby moves the feelers of all lower orders to disengage said pawls to enable them to engage the ratchet bars of the lower orders to lock the same against movement, a lever engaging the feeler of highest order, and a cam on said shaft adapted to move said lever upon rotation of said shaft to lock all of said ratchet bars.

13. In an overdraft preventing check marking device comprising a subtraction mechanism including a number of individually movable ratchet bars and a number of totalizer wheels operable by said ratchet bars, the provision of a main shaft, safety pawls in connection with said ratchet bars, feelers pivoted on said main shaft adapted to engage with teeth on said ratchet bars, means on said feelers normally engaging the pawls to hold them out of engagement with the ratchet bars, springs acting on said feelers, means on each feeler engaging the feeler of next lower order, whereby movement of any ratchet bar moves its feeler and thereby moves the feelers of all lower orders to disengage said pawls to enable them to engage the ratchet bars of the lower orders to lock the same against movement, a lever en-

gaging the feeler of highest order, a cam on said shaft to move said lever upon rotation of said shaft to lock all of said ratchet bars, and a fixed projection engaged with the pawl of the ratchet bar of highest order.

14. In an overdraft preventing check marking device comprising a subtraction mechanism including a number of individually movable ratchet bars and a number of totalizer wheels operable by said ratchet bars, the provision of a main shaft, safety pawls in connection with said ratchet bars, feelers pivoted on said main shaft adapted to engage with teeth on said ratchet bars, means on said feelers normally engaging the pawls to hold them out of engagement with the ratchet bars, springs acting on said feelers, means on each feeler engaging the feeler of next lower order, whereby movement of any ratchet bar moves its feeler and thereby moves the feelers of all lower orders to disengage said pawls to enable them to engage the ratchet bars of the lower orders to lock the same against movement, a platen, a pivoted press bar, cams operated by movement of said main shaft to move said press bar to engage the racks and press them against the platen, a spring to return said press bar, a lever engaging the feeler of highest order, and a cam on said main shaft adapted to move said lever upon rotation of said shaft to lock all of said ratchet bars at the beginning of the printing operation.

15. In an overdraft preventing check marking device comprising a subtraction mechanism including a number of individually movable ratchet bars and a number of totalizer wheels operable by said ratchet bars, the provision of a main shaft, safety pawls in connection with said ratchet bars, feelers pivoted on said main shaft adapted to engage with teeth on said ratchet bars, means on said feelers normally engaging the pawls to hold them out of engagement with the ratchet bars, springs acting on said feelers, means on each feeler engaging the feeler of next lower order, whereby movement of any ratchet bar moves its feeler and thereby moves the feelers of all lower orders to disengage said pawls to enable them to engage the ratchet bars of the lower orders to lock the same against movement, a platen, a pivoted press bar, cams operated by movement of said main shaft to move said press bar to engage the racks and press them against the platen, a spring to return said press bar, a lever engaging the feeler of highest order, a cam on said main shaft adapted to move said lever upon rotation of said shaft to lock all of said ratchet bars at the beginning of the printing operation, and a fixed projection engaged with the pawl of the ratchet bar of highest order.

16. In an overdraft preventing check marking device comprising a subtraction mechanism including a number of individually movable ratchet bars and a number of totalizer wheels operable by said ratchet bars, the provision of a main shaft, safety pawls having projections thereon and adapted to lock said ratchet bars against forward movement, and means to move said pawls out of locking position, said means comprising a cam on said main shaft, a lever operated by said cam, and a release bar operated by said lever having a projection thereon adapted to engage the projections on said pawls to move said pawls out of locking position.

17. In an overdraft preventing check marking device comprising a subtraction mechanism including a number of individually movable ratchet

bars swingable laterally to print a check and a number of totalizer wheels operable by said ratchet bars, the provision of means to move said bars to print, and means to prevent lifting of the ratchet bars above the teeth of the totalizer wheels before commencement of the printing movement.

18. In an overdraft preventing check marking device comprising a subtraction mechanism including a number of individually movable ratchet bars swingable laterally to print a check and a number of totalizer wheels operable by said ratchet bars, the provision of a main shaft, means operated by movement of the main shaft to move the bars to print, and means to prevent lifting of the ratchet bars above the teeth of the totalizer wheels, said last means being rendered ineffective by the initial movement of the main shaft.

19. In an overdraft preventing check marking device comprising a subtraction mechanism including a number of individually movable ratchet bars swingable laterally to print a check and a number of totalizer wheels operable by said ratchet bars, the provision of means to move said bars to print, means operated at the beginning of the printing movement to lock the ratchet bars against forward movement, and means to prevent lifting of the ratchet bars above the teeth of the totalizer wheels before commencement of the printing movement.

20. In an overdraft preventing check marking device comprising a subtraction mechanism which includes a number of singly movable ratchet bars having printing blocks thereon and a number of totalizer wheels operable by said ratchet bars, means supporting said ratchet bars for movement longitudinally and towards and away from the teeth of the totalizer wheels, the provision of an oscillating frame, a safety bar carried by said oscillating frame, means to oscillate said frame so as to move the safety bar towards and away from the printing blocks on the ratchet bars and to thereby ensure a certain distance being maintained between the ratchet bars and the safety bar for the purpose of normally preventing the ratchet bars being raised above the teeth of the totalizer wheels.

21. In an overdraft preventing check marking device comprising a subtraction mechanism which includes a number of singly movable ratchet bars having printing blocks thereon and a number of totalizer wheels operable by said ratchet bars, means supporting said ratchet bars for movement longitudinally and towards and away from the teeth of the totalizer wheels, the provision of an oscillating frame, a safety bar carried by said oscillating frame, means to oscillate said frame so as to move the safety bar towards and away from the printing blocks on the ratchet bars and to thereby ensure a certain distance being main-

tained between the ratchet bars and the safety bar for the purpose of normally preventing the ratchet bars from being raised above the teeth of the totalizer wheels, said means comprising a main shaft, a lever arm on the pivot of said frame, a cam actuated by the main shaft, bars between said cam and said lever arm, and straight guides for guiding said bars so as to rock the frame and thereby swing the safety bar.

22. In an overdraft preventing check marking device in combination with a subtraction mechanism comprising ratchet bars and a totalizer, a printing device, means for holding a supply of printing paper, a paper feeding mechanism, and means for delivering printed slips from the apparatus, the provision of locking means for preventing movement of the totalizer past its zero position in a negative direction, means for unlocking said locking means, means to prevent forward movement of more than one ratchet bar at a time, a control shaft, means operated by movement of the control shaft to operate the printing device, means to prevent forward shifting of any of the ratchet bars during rotation of the control shaft, means for preventing the ratchet bars from being lifted above the teeth of the wheels of the totalizer during forward movement, and means in connection with said ratchet bars to prevent impeding their return after operation of the printing device.

23. In an overdraft preventing check marking device comprising, within a casing, a figure setting device, a totalizer having a number of indicator wheels, a printing device, means to hold a supply of printing paper, and means for delivering printed slips from said holding means, the provision of means for normally preventing movement of the indicator wheel of highest order past its zero position in a negative direction, a keyhole in said casing, a seal normally covering said keyhole, and means operable by a key inserted through said keyhole for moving said preventing means to inoperative position so as to permit movement of said indicator wheel of highest order past its zero position in a negative direction.

24. In an overdraft preventing check marking device comprising a figure setting device, a totalizing subtraction mechanism including a number of indicator wheels, a printing device, means to hold a supply of printing paper, and means for delivering printed slips from said holding means, the provision of an addition lock associated with the indicator wheel of highest order only, for locking the indicator wheel against movement through its zero position, said lock comprising a slot in said indicator wheel and a spring controlled subtraction preventing lock lever having a nose adapted to enter said slot.