July 10, 1934. R. H. TATE 1,966,320

APPARATUS FOR AUTOMATICALLY DELIVERING TREASURY NOTES AND THE LIKE

Filed Jan. 3, 1933 2 Sheets-Sheet 1

Fig. 1.

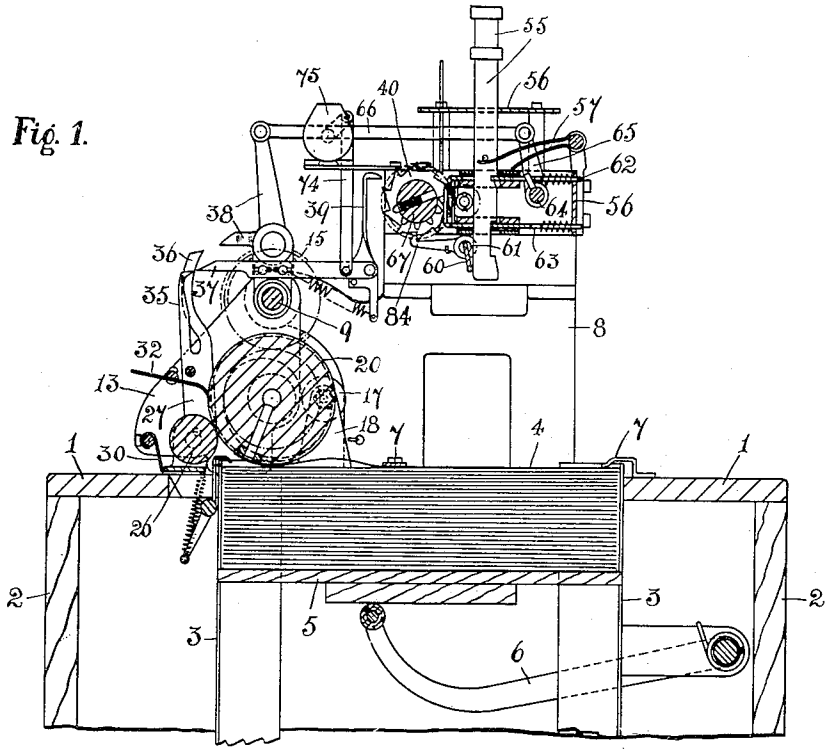
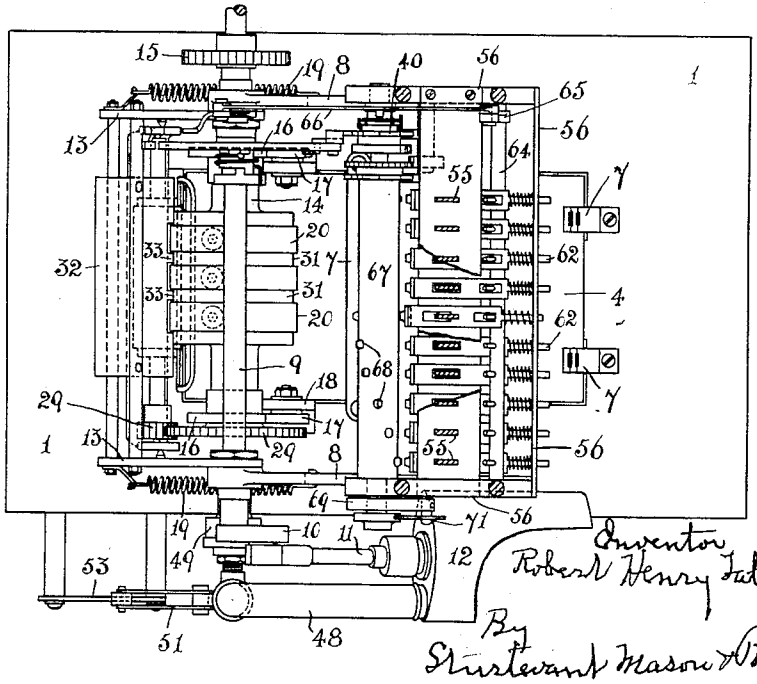


Fig. 2.



Inventor
Robert Henry Tate
By
Sturtevant Mason & Porter
Attorneys

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Filed Jan. 3, 1933 2 Sheets-Sheet 2

Fig. 3.

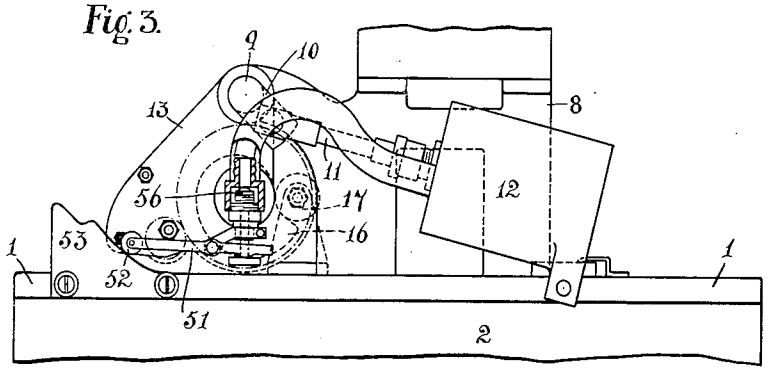


Fig. 4.

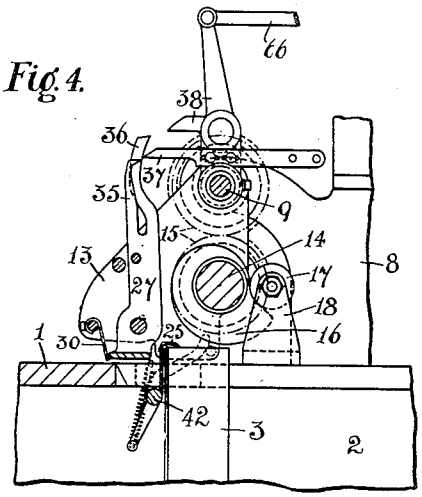


Fig. 6.

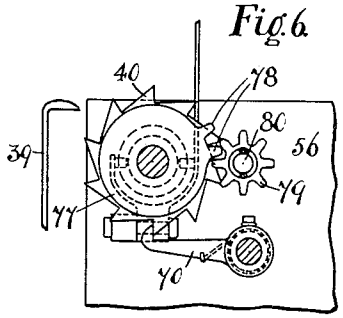


Fig. 7.

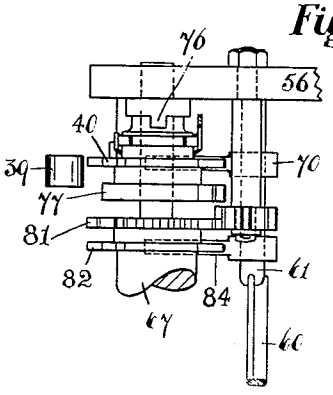
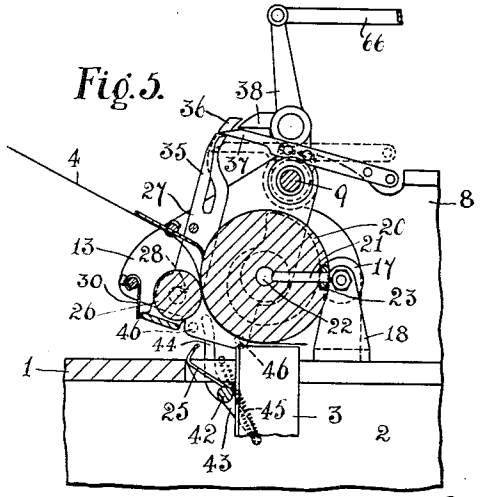


Fig. 5.



Inventor
Robert Henry Tate
By Sturtevant Mason & Porter
Attorneys.

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UNITED STATES PATENT OFFICE

1,966,320

APPARATUS FOR AUTOMATICALLY DELIVERING TREASURY NOTES AND THE LIKE

Robert Henry Tate, Hendon, England

Application January 3, 1933, Serial No. 650,000
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14 Claims. (Cl. 133—4)

This invention relates to improved apparatus for automatically delivering treasury notes and the like, and its object is to provide means for delivering one at a time, any required number of notes from a magazine in which the bulk are disposed, and at the same time registering each one as it is delivered.

According to this invention, the delivery of the notes by the apparatus is controlled by numbered keys, and the depression of each key results in the delivery of notes equal in number to the numeral on the key depressed.

In its simplest form, ten keys are provided, numbered from one to ten, and any number of notes from one to ten may be obtained by pressing the correct key. On the completion of each delivery, the apparatus which may be driven by power, stops, and all the parts are automatically returned to normal again.

If desired means may be provided which can be used at will, for changing the delivery from the units to a multiple of the same, say for example tens. This feature increases the scope of the apparatus and can be used when large numbers of notes have to be dealt with.

A feature of this invention is that the notes are removed one by one from the top of a pile disposed in a magazine, by the action of a rotating and oscillating roller formed with suction ports connected to an exhaust pump or the like, and a further feature is that provision is not only made for recording each note as it is delivered, but provision is made whereby the delivery is stopped when two or more notes are taken from the magazine instead of one, and no delivery of a note is registered until it has been actually effected.

The invention will now be particularly described with reference to the accompanying drawings, in which

Fig. 1 is a sectional side elevation and

Fig. 2 a plan of treasury note delivering apparatus constructed according to my invention.

Fig. 3 is a side elevation partly in section showing the exhaust pump connections and the valve controlling mechanism.

Fig. 4 is a sectional side elevation showing the controlling mechanism in connection with the note delivery rollers.

Fig. 5 is a similar view to Fig. 4 illustrating the action of the note delivery controlling mechanism.

Fig. 6 is a side elevation, and

Fig. 7 is a plan of the change gear mechanism associated with the key releasing mechanism.

Like letters indicate like parts throughout the drawings.

In the preferred construction, a horizontal table 1 (see Figs. 1 and 2) which may be supported on the top of a box or casing 2, is provided with an opening which is of the exact size and shape of a treasury or other note, and below this opening is a magazine 3 of the same dimensions in plan, in which the notes 4 are placed. The notes 4 in this magazine are supported on a platform 5 (see Fig. 1) which rests on the free end of a spring actuated arm 6, and the latter presses the notes 4 up to stops 7 provided at the level of the upper face of the table 1. The upper one of the pile of notes 4 is thus always held flush with the upper surface of the table 1 ready to be removed. The table 1 may be hinged to the box or casing 2 in order that it can be turned up in order to facilitate the insertion of the notes in the magazine 3.

At each side of the opening in the table 1 is a standard 8, and mounted in bearings at the upper part of these standards is a main driving shaft 9, one end of which is connected by means of any convenient form of driving clutch to an electric motor or other source of power, whilst its other end is fitted with a crank 10 (see Figs. 2 and 3) which is connected to the piston rod 11 of and actuates the piston of a suction pump 12, which latter may be conveniently disposed on the top of the table 1.

Mounted loosely on the main shaft 9 described, is the upper end of an oscillating frame 13 comprised of two interconnected side frame members, and mounted in bearings in the lower part of the latter are the journals 14 of a roller 20. This roller 20 is geared to the main shaft 9 by means of a pair of gear wheels 15 having the same diameter (see Fig. 4) disposed respectively on the said shaft 9 and one of the roller journals 14.

The journals 14 of the roller 20, are also fitted with cams 16 (see Figs. 2, 3 and 4) these cams bear on antifriction rollers 17 mounted on axles carried by brackets 18 secured on the table 1, and one or more springs 19 are connected to the oscillating frame 13 in order to hold the cams 16 described up to the rollers 17. As a result of this arrangement, the roller 20 not only makes the same number of revolutions as the main shaft 9, but owing to the action of the cams 16 thereon, both it and the frame 13 in which it is carried, receive a swinging motion about the driving shaft 9.

As seen in Fig. 1, the driving shaft 9 rotates

anticlockwise, and the roller 20 clock-wise, and a peculiar feature of the arrangement described is, that when the roller 20 is swinging to the right or rearwardly, this motion neutralizes the action of the gear wheels 15, and at this time the roller 20 either does not turn or turns slower than the main shaft 9, whilst when swinging to the left or forward, the conditions are reversed, and the roller 20 then rotates faster than the main shaft 9.

The roller 20 is preferably of the same or of a little less width than the notes 4 in the magazine 3, and of such a diameter that when it swings rearwardly about the driving shaft 9, its underside will rub on the fore end of the top one in the magazine 3.

At one point in its outer circumference, the roller 20 described, hereinafter termed the suction roller, is formed with preferably two or more suction ports 21, (see Fig. 5) these ports are connected to an axial passage 22 therein, and the end of this axial passage is connected, as will be hereinafter described, to the suction pump 12. The ports 21 described may have elastic cushions 23 round their orifices and these cushions may be formed of india-rubber.

As the suction roller 20 swings back with the frame 13 as previously described, that part in which the suction ports 21 are disposed, rubs on the end of the top note in the magazine 3, and suction being then applied by means of the pump 12, the top note is connected to the roller 20, and the following action takes place.

The rearward movement of the suction roller 20 which for the reasons previously stated does not turn to any material extent during this action, is continued until the fore end of the top note is moved by the said roller 20 clear of the end of the next one, so as to permit of a movable stop 25 (see Figs. 4 and 5) moving over the latter and retaining it whilst the top note is being withdrawn.

On the completion of this action, the suction roller 20 starts to swing forward, and this forward movement is accompanied by an accelerated turning movement, which serves to draw the released note rapidly forward and deliver it.

This delivery action is assisted by providing a second supplementary roller 26 in front of the suction roller 20 previously described, but of much less diameter than the latter. The journals of this supplementary roller 26 are mounted in bearings in the end members of a frame 27 which is pivoted at 28 (see Fig. 5) in the end frame members of the swinging frame 13. This roller 26 is further geared to the suction roller 20 by means of gear wheels 29 (see Fig. 2) so as to cause it to revolve at the same surface velocity as the said suction roller 20, and the roller 26 is normally held close up to the roller 20 by means of a spring or springs 30.

Each note 4 as it is withdrawn from the pile in the magazine 31 passes between this supplementary roller 26 and the suction roller 20, and is stripped from the latter and delivered free, at the front of the said rollers.

In order to strip the notes from the suction roller 20, the latter is formed with grooves 31 (see Fig. 2) between its suction ports, and a plate 32 disposed above the supplementary roller 26, is provided with stripping fingers 33, which have their tips located in the grooves 31 in the suction roller 20.

It will be appreciated that when a note 4 passes between the two rollers 20 and 26 described, the supplementary roller 26 will be moved away from the suction roller 20 a distance which is equal to the thickness of the note. It will also be understood that this movement will be transmitted to the frame 27 that carries the said roller 26, and this movement is utilized to register the number delivered, and stop the delivery should more than one note be withdrawn from the magazine and be interposed between the said rollers.

For this purpose, the frame 27 (see Figs. 1–4 and 5) is provided with two upwardly extending arms 35 and 36, and associated with the former 35 is a pawl lever 37, whilst a stop lever 38 is associated with the arm 36. The action of this particular arrangement is as follows:—Normally the arm 35 is so disposed that its upper end just misses the end of the pawl lever 37, when the suction roller 20 swings forward, but when a note is interposed between the latter and the roller 26, the upper end of the arm 35 is moved-in so as to engage with and trip the pawl lever 37 as shown in Fig. 5, and a pawl 39 on the latter (see Fig. 1) will then engage with and advance the ratchet wheel 40 one tooth. This ratchet wheel is associated with finger key releasing mechanism hereinafter described.

Should however two notes for instance start to pass between the rollers 20 and 26, the upper end of the other arm 36 will now be moved in far enough to engage with and trip the stop lever 38, which is connected to another key releasing arrangement that will be hereinafter described.

The movable stop 25 hereinafter referred to, is carried by a rocking shaft 42 which is mounted in bearings secured to either the table 1 or the magazine 3 (see Fig. 5) and it is provided at one end with two arms 43 and 44. One arm 43 is connected to a spring 45, whilst the other arm 44 is disposed in the path of two studs 46 on the swinging suction roller frame 13. These studs engage with the arm 44 and move it a certain distance first in one direction and then the other and these movements are completed by the action of the spring 45 after the latter has been moved over the line of the dead centres. The stop 25 is by this arrangement moved over the top note but one in the magazine 3 when the top one is being withdrawn, and is after this operation has been completed moved clear again by the return movement of the roller frame 13.

The end of the axial passage in the suction roller 20, is connected preferably by means of a flexible length of tubing 48 (see Figs. 2 and 3) to the suction pump 12, a stuffing gland 49 (see Fig. 2) that will permit of the roller rotating being provided where the connection to the journal 14 of the latter is made.

A suction controlling valve 50 (see Fig. 3) is also provided at this point, and this valve is controlled by means of a lever 51 provided with a roller 52 at its free end, which runs on a fixed cam race 53 on the table 1, as the suction roller 20 and its frame 13 swing backwards and forwards. This arrangement is adapted to open the valve 50 at the proper time for the suction to pick up the top note in the magazine, and subsequently close it again in order to release the note.

The controlling finger keys 55 are in the form of vertical plungers and are arranged in a transverse row in a transverse framing 56 (see Figs. 1 and 2) secured on the top of the standards 8 previously described. These keys may be provided with tops of the usual type, so that they can be conveniently depressed by a finger of the operator, and they are returned when released by springs 57 as shown in Fig. 1. In the simplest

form of apparatus, ten of these keys are provided and they bear the numbers 1 to 10.

Below the keys 55 is a universal rocking bar 60, which is engaged by the lower end of any one of the keys 55 when they are depressed, and the said bar then receives a turning movement about its end journals 61 which are mounted in the end members of the frame 56. This bar 60 is connected to and controls the driving clutch or the driving motor switch and the arrangement is such, that the depression of any one of the keys 55 closes the motor switch or a driving clutch (not shown) and starts the main shaft 9 and the consequent delivery of the notes 4 from the magazine.

In connection with each key 55 are two spring actuated sliding catches 62 and 63, these catches are mounted in the frame 56, and the upper one 62 is adapted to engage with an upper notch in its key 55 and the lower one 63 with a lower notch in its key. Each key 55 when fully depressed is held down by its catch 62, and the apparatus continues to deliver the notes 4 from the magazine 3 until the depressed plunger is released, and is returned by its spring 57 to either its normal, or to an intermediate position where it is retained by its catch 63 as will be hereinafter described.

On the underside of the sliding catches 62 is a catch withdrawing shaft 64, which is mounted in bearings in the end members of the frame 56, this shaft 64 is adapted to withdraw all the catches 62, and is for this purpose provided with an arm 65 that is connected by a link 66 to the stop lever 38 previously described. When this lever 38 is tripped by the arm 36 as previously described, the shaft 64 is actuated so as to withdraw all the catches 62, so that the depressed key 55 is released by its catch 62, and it then returns to an intermediate position where it is held by its other catch 63. This arrangement is provided in order to stop the delivery of notes when two or more pass between the rollers 20 and 26, without permitting the several parts to return to normal as will be hereinafter described, so that after removing the excess notes, the delivery of the predetermined number of notes which has been interrupted, can be continued.

In front of the sliding catches 62 and 63 described, is a transverse catch releasing roller 67, provided with cam projections 68 arranged in a helical manner so that they will trip the lower set of finger key catches 63 in succession, that is, the first of the projections 68 is adapted to trip the catch 63 of number one key, and the remainder of the projections 68, the remainder of the catches 63, in regular sequence.

The ratchet wheel 40 previously described is mounted on the end of this roller 67, so that as the ratchet wheel 40 is advanced tooth by tooth by the pawl 39 on the lever 37 as previously described, the roller 67 will be advanced and the different, cam projections 68 described are brought into action in succession, and the key 55 depressed will be released by the action of a projection 68 on its catch 63 when the ratchet wheel 40 has been advanced the number of teeth indicated on the key, and consequently this number of notes 4 will have been delivered.

The fore ends of the catches 63 on which the roller projections 68 act, are formed so as to overlap the fore ends of the catches 62, so that when the former 63 are pushed in by the arrangement described, both catches will be released simultaneously and the key 55 depressed will be able to fully return to its normal position.

The ratchet wheel on the roller 67 when advanced by the pawl 39, is retained by a spring actuated detent 70 (see Fig. 1). This detent is mounted on the journal 61 of the universal bar 60, and the connection between the two is so arranged that when the bar 60 is permitted to return to its normal position, this detent will be withdrawn, and the ratchet wheel 40 together with the roller 67 will be returned to its initial position, a result which is effected by a spiral spring 69 which is as shown in Fig. 2 connected to one end of the shaft 67. When returned to its normal position as described, the roller 67 is checked by a stop 71 shown in Fig. 2.

The action of the apparatus is as follows:—On depressing the key which bears the number 5 for example as shown in Fig. 1, the universal bar 60 is turned and this action is utilized to throw in the driving clutch and start the driving shaft 9. At the same time the detent 70 is moved into position to prevent the ratchet wheel 40 from running back, and owing to the depressed key being retained in its depressed position by its catch 62, the delivery of the notes will proceed without further attention.

As each note is delivered, the arm 35 on the supplementary roller frame 13 actuates the pawl lever 37, and the ratchet wheel 40 is advanced by the pawl 39 on the said lever 37 so that every note is recorded. Should the suction roller 20 fail at any time to withdraw a note, no action will take place.

When five notes have been delivered, a cam projection 68 on the roller 67 will operate the catch 63 of and release the depressed key No. 5 when it will be immediately raised by its spring 57, and this action will be followed by the disconnection of the driving means and the return of all the parts to their original positions again.

Should however two notes attempt to pass between the delivery rollers 20 and 26, the additional motion imparted to the roller frame 13 will bring the arm 36 into engagement with the stop lever 38, this lever will operate the catch withdrawing bar 64, and the key 55 depressed will then return to its intermediate position where it is checked by its lower catch 63. This will permit of the universal bar 60 turning sufficiently far to disconnect the driving means and stop the driving shaft 9, but not far enough to remove the detent 70 from the ratchet wheel 40, and permit of the return of the roller 67 to its normal position. At the same time the stopping of the apparatus is effected before the pawl 35 has advanced the ratchet wheel 40 and registered the operation.

As a result of this action, the delivery of the notes can be recommenced again and the correct number be obtained and registered, by removing any excess notes and then fully depressing the finger key until it is again held by its catch 62.

In order to obtain a record of the total number of notes dealt with, counting and registering mechanism 75 (see Fig. 1) of any convenient type may be employed, and it is preferably disposed above the pawl lever 37, so that it can be connected to the latter by means of a link 74 as shown.

It will be appreciated that by an adjustment of the gearing between the ratchet wheel 40, and the finger key releasing cam roller 67, the finger keys may each be adapted to release notes which may be a multiple of the number indicated there-

on. This may be conveniently effected by the arrangement shown in Figs. 6 and 7.

In this arrangement, the ratchet wheel 40 is normally connected to the journal of the roller 67 by means of a clutch 76, and it can by a lateral movement be disconnected from the roller and be clutched to a wheel 77, both of which will then be free to rotate on the roller journal. The wheel 77 is provided with two teeth 78 and these teeth engage with a pinion 79 which is disposed on a fixed axle 80 and is in gear with a toothed wheel 81 on the roller 67 (see Fig. 7). With this arrangement the roller 67 is only advanced one step every revolution of the ratchet wheel 40, and as the latter has ten teeth the numerals on the keys will then represent tens instead of units. When this arrangement is adopted, the roller 67 is prevented from running back until such time as it is released, by means of a ratchet wheel 82 on the said roller, and another detent 84 which is mounted on the journal 61 of and controlled by the universal bar 60.

If preferred, one and the same apparatus may be adapted to deliver notes of two different sizes, say for example one pound, and ten shilling notes, by providing two magazines, arranging the latter side by side, and duplicating the necessary parts of the note withdrawing mechanism.

The arrangement can be conveniently adapted for counting notes, and in this case the finger key mechanism is not required. It will also be appreciated that for this particular purpose it would be more convenient if the magazine was inverted, and the note withdrawing mechanism disposed on its underside.

I claim:—

1. Note delivering apparatus including in combination a magazine for holding the notes, a rotatable roller for withdrawing the notes one by one from the magazine, said roller being provided with at least one port in its periphery, a suction pump connected to said port, means for imparting both a rotating and a swinging action to said roller, and driving means for said pump and imparting means.

2. In note delivering apparatus, the combination with a magazine for holding the notes, of a roller for withdrawing the latter one at a time provided with one or more ports connected to a suction pump, and means for imparting both a rotating and swinging action to the said roller.

3. In note delivering apparatus, the combination of a magazine for holding the notes, a roller having at least one suction port, a suction pump and a connection therefrom to said port, a valve in said connection, means for actuating the said valve whereby the suction is applied to and removed from the notes at the proper times during the process of delivering each of the latter, and means for imparting both a rotating and a swinging action to said roller.

4. In note delivering apparatus, the combination with a main note delivering roller and a frame in which said main roller is journaled, of a supplementary roller geared to said main roller, a supplementary frame pivoted on said main frame and supporting said supplementary roller, and means for holding the supplementary roller up to the main roller whereby the supplementary frame receives a movement about its pivot when a note is passed between the said rollers.

5. Note delivering apparatus according to claim 4, in which the supplementary roller is held up to the main roller by at least one spring and said supplementary frame is provided with an arm, and including a ratchet wheel, a pawl co-operating with said ratchet wheel and engageable by said arm to effect the advance of said ratchet wheel, key mechanism for controlling the actuation of said main roller, and key release mechanism actuated by said ratchet.

6. Note delivering apparatus according to claim 4, in which the supplementary frame is provided with an arm, a lever engaged by said arm when two or more notes are interposed between the rollers, a finger key and means actuated thereby for controlling the operation of said rollers, a detent for holding the key in an operated position, means controlled by said lever for releasing said detent, and means for moving said key to another position upon release of said detent whereby to stop the delivery.

7. In note delivering apparatus, the combination of a magazine for holding the notes, suction roller mechanism for withdrawing them one at a time, means for actuating the roller, a series of finger keys, key detents, means operated by the delivery of the notes for releasing the detents, a universal rocking bar associated with the keys, and means for connecting said bar and said roller actuating means so that the delivery of notes is started by the depression of any of the keys and is continued until the corresponding key detent is released.

8. In note delivering apparatus, the combination of a magazine for holding the notes, a main roller frame, a suction roller journalled in said frame for withdrawing the notes one at a time, a supplementary note delivery roller, a supplementary frame in which it is journalled, said supplementary frame being pivoted in the main roller frame, means for holding the supplementary roller up to the suction roller so that the supplementary frame is moved angularly each time a note passes between the rollers, a series of finger keys, means for connecting the keys to the suction roller controlling mechanism, duplicate detents for holding the keys down when depressed, duplicate detent releasing mechanism, and arms on the supplementary frame which are operated from said supplementary frame to engage with and to actuate one detent releasing mechanism each time a note passes between the rollers, and to actuate the other detent releasing mechanism when more than one note is withdrawn from the magazine.

9. In note delivery apparatus, the combination of a magazine for holding the notes, a main roller frame, a suction roller for withdrawing the notes one at a time and journalled in said main frame, means for actuating and controlling the roller and main frame, a supplementary note delivery roller, a supplementary frame therefor pivoted on the main frame, a series of finger keys having numerals thereon, a universal bar associated with the finger keys, a connection from said bar to said means for controlling the same, a pair of detents for each of the finger keys, a detent releasing means associated with the lower set of detents and provided with devices for releasing the detents in succession and therewith releasing the corresponding key when a number of notes has been delivered equivalent to the numeral on the key, a ratchet wheel to which the releasing means is connected, pawl mechanism for advancing the ratchet wheel, and an arm on the supplementary frame which engages with and actuates the pawl mechanism each time a note passes between the rollers.

10. A note delivery mechanism according to claim 9, including a reducing gear train connectable between the ratchet wheel and releasing means so that the number of notes delivered will be a multiple of the numeral on the depressed key.

11. In note delivering apparatus, the combination of a magazine, a swinging main frame, a main note removing roller journalled on said main frame for withdrawing notes one by one from the magazine and provided with at least one port connected to a suction pump, means for imparting a rotating motion to the roller and a swinging motion to said frame, a movable stop, an arm associated therewith, and parts on the main frame which are adapted to engage with the said arm and move the stop over the second note in the magazine so as to retain it while the top note is being withdrawn and subsequently withdraw the stop.

12. A note delivering apparatus according to claim 9, including a device for returning the releasing means to zero, second detents for the releasing means, and means for releasing the second detents and controlled by the universal bar for withdrawing the said second detents and permitting the return of said releasing means to zero at the completion of the delivery of the required number of notes.

13. In note delivering apparatus, the combination of a magazine for holding the notes, a main roller for withdrawing the latter one at a time provided with one or more ports connected to a suction pump, means for imparting both a rotary and a swinging motion to the said roller and including a main roller frame, a supplementary note delivering roller, and a supplementary frame in which the latter is journalled, said supplementary frame being pivoted in the main roller frame and being adapted to hold the supplementary delivery roller close up to the suction roller so that the supplementary frame is moved angularly by each note as it is delivered.

14. In note delivering apparatus, the combination of a magazine for holding the notes, suction roller mechanism for withdrawing them one at a time including a main roller frame, means for actuating the roller, a supplementary note delivery roller mounted in a frame pivoted on the main roller frame, a series of finger keys, a universal bar associated with the finger keys, means for connecting said bar and said roller actuating means, upper and lower detents for each of the finger keys, a detent releasing shaft associated with the upper set of detents, a stop lever to which the detent releasing shaft is connected, and an arm on the supplementary note delivery roller frame for engaging and operating the stop lever to release the upper detents of the keys when two notes attempt to pass between the supplementary delivery and suction rollers, whereby the delivery of notes is stopped.

ROBERT HENRY TATE.