Sept. 22, 1942. E. J. SHEEHY ET AL 2,296,312

VARIABLE AUTHENTICATOR

Filed May 12, 1941 2 Sheets-Sheet 1

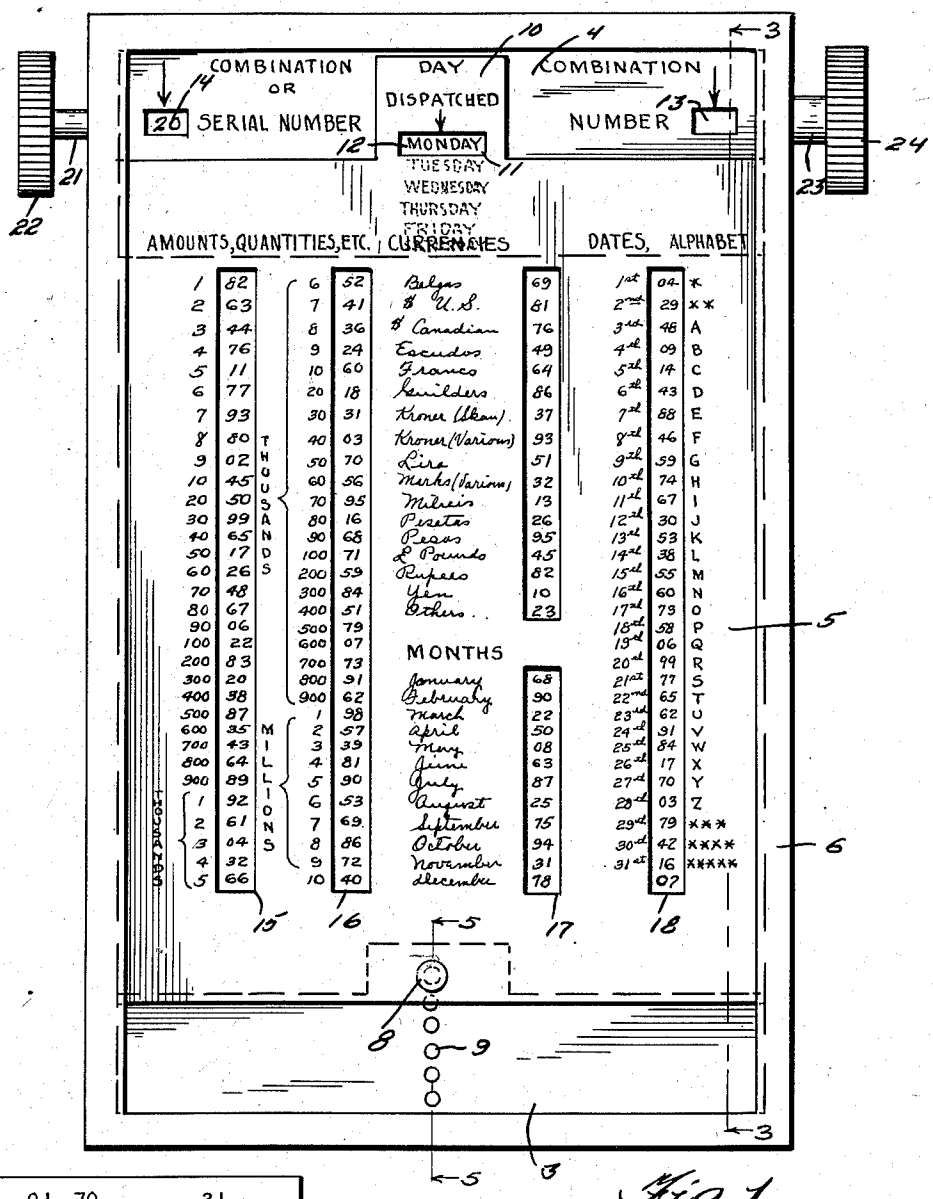


Fig. 1.

01	70	21
02	56	25
03	95	88
04	16	12
05	68	34
06	71	55
07	39	49
08	84	23
09	51	08
10	79	94
11	07	09
12	73	37
13	91	01
14	62	15
15	98	28
16	57	74
17	39	10

37

Fig. 2.

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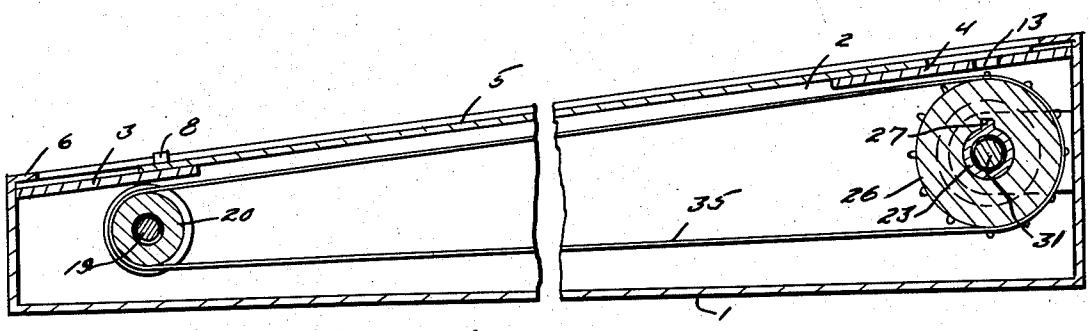


Fig. 3.

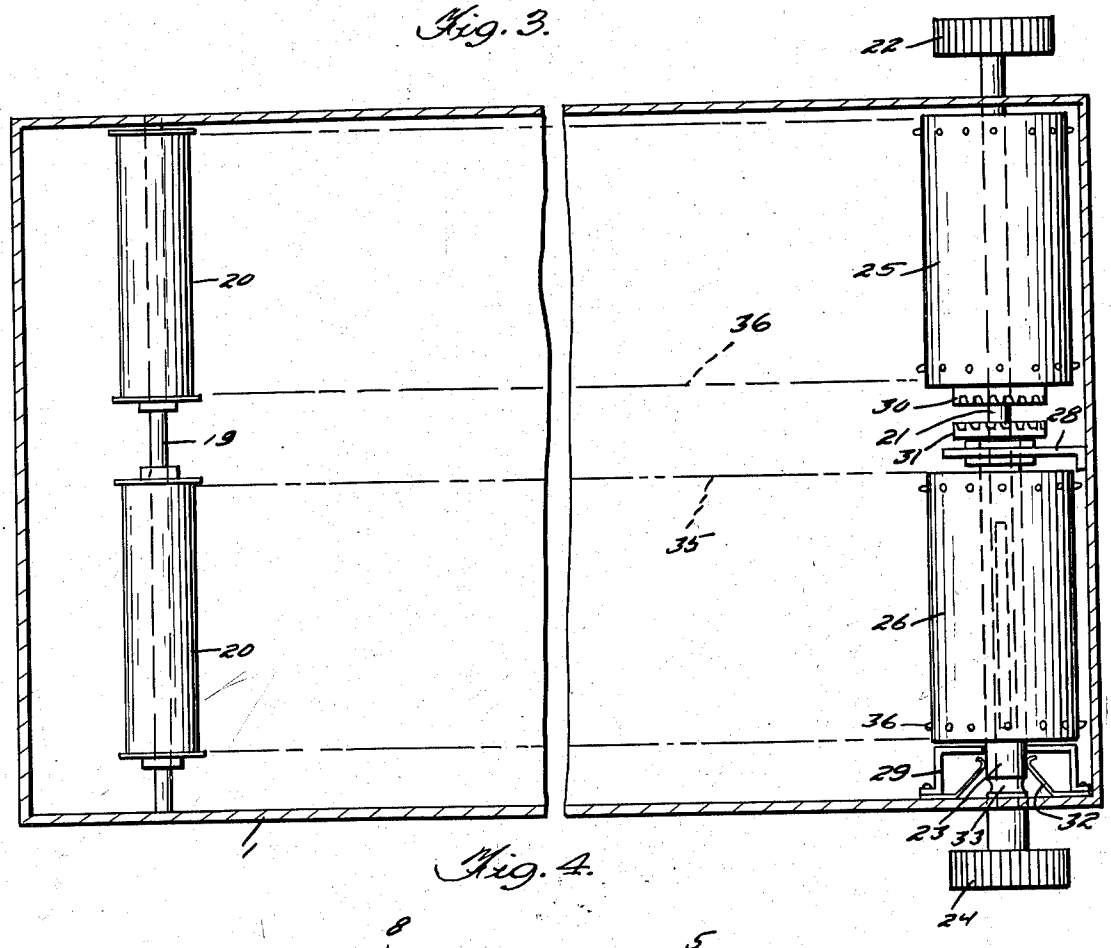


Fig. 4.

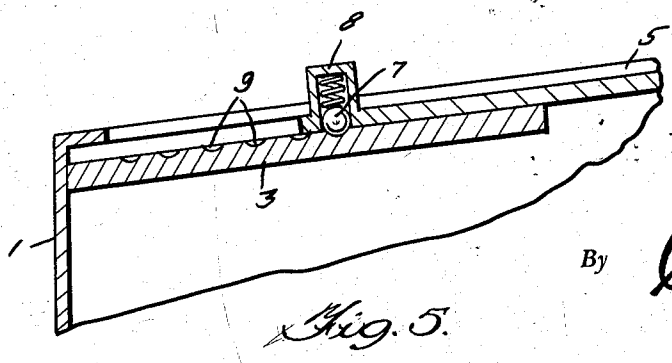


Fig. 5.

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VARIABLE AUTHENTICATOR

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Application May 12, 1941, Serial No. 393,140

3 Claims. (Cl. 35—3)

This invention relates to a variable authenticator, the general object of the invention being to provide a mechanically variable and secret means for the authentication and verification of telegraphic, telephonic and mail communications, and the use of this device will safeguard the users against fraudulent messages, tampering with or transmission errors in the essential parts of messages.

The device can also be used in conjunction with a prearranged formula to compose secret cipher messages and under certain conditions will effect a saving in the cost of telegraphic communications.

This invention also consists in certain other features of construction and in the combination and arrangement of the several parts to be hereinafter fully described, illustrated in the accompanying drawings and specifically pointed out in the appended claims.

In describing the invention in detail, reference will be had to the accompanying drawings wherein like characters denote like or corresponding parts throughout the several views, and in which:

Figure 1 is a top plan view of the device.

Figure 2 is a fragmentary view of one of the belts used with the device.

Figure 3 is a section on the line 3—3 of Figure 1.

Figure 4 is a horizontal sectional view showing the interior parts.

Figure 5 is a section on the line 5—5 of Figure 1.

In these views the numeral 1 indicates a casing which preferably has its top sloping downwardly from one end to the other and said top has an opening 2 therein. A shield member 3 extends across the upper portion of the casing at the small end thereof and a shield member 4 extends across the high part of the casing, the opening being arranged between these shield members. A sliding cover 5 covers the opening 2 and has its end overlapping the members 3 and 4 and said cover is slidingly held in place by a flange 6 at the top of the casing. The cover 5 is held in adjusted position by means of a spring-pressed detent 7 arranged in a small housing 8 at the lower end of the cover, the detent engaging any one of a row of holes 9 in the member 3. The upper end of the cover is formed with a centrally located extension 10 which has a slot 11 therein for exposing any one of the names of the days of the week as shown at 12 in Figure 1, these names being placed on the member 4. By adjusting the cover downwardly or upwardly the desired day of the week will be exposed through the opening. A window 13 is formed in the member 4 adjacent one end thereof and a second window 14 is formed in the member 4 adjacent the other end thereof and suitable indicia is carried by the member 4 adjacent the windows and the slot 11, as shown in Figure 1. The cover is also formed with elongated windows or slots 15, 16, 17 and 18, the window 17 being formed of two sections, the lower section having adjacent thereto indicia giving the names of the months while the upper section has adjacent thereto indicia indicating the moneys of various countries. The other windows have the numerals and letters adjacent thereto as shown in Figure 1 and above these windows and indicia are the words "Amounts, quantities, etc.," "Currency," "Date" and "Alphabet" also shown in Figure 1.

A shaft 19 extends across the casing adjacent its lower end and a pair of drums 20 are rotatably arranged thereon. A shaft 21 passes through the casing adjacent the large end thereof and one end of this shaft extends from the casing where it is provided with a knob 22. A tubular shaft 23 telescopes the inner end of the shaft 21 and this tubular shaft has an end extending from the opposite side of the casing and has attached thereto a knob 24. A drum or roll 25 is fastened to the shaft 21 while a similar drum or roll 26 is slidably but non-rotatably connected with the tubular shaft 23 by means of a key 27 fitting in a slot in the drum 26.

Stop members 28 and 29 are arranged in the casing and prevent sliding movement of the drum or roll 26. A clutch member 30 is carried by the inner part of the shaft 21 for engagement with a clutch member 31, carried by the tubular shaft 23, the two clutch members engaging with each other when the tubular shaft 23 is pushed inwardly by the knob 24. The clutch parts are held in engagement by the spring fingers 32 engaging a groove 33 in the tubular shaft. However, a pull on the knob 24 will cause the tubular shaft to move to the right in Figure 4 so that the spring fingers will move out of the groove.

Of course, it will be understood that when the clutch parts are in engagement the two drums or rolls 25 and 26 will be moved in unison when either one of the knobs 22 and 24 is turned but when the clutch parts are out of engagement then the drums 25 and 26 are individually moved by the knobs 22 and 24. An endless belt or tape 35 passes over the drum 26 and the drum or roll 20 which is in alignment with the drum or roll 26, while a belt or tape 36 passes over the drum

or roll **25** and the opposite drum or roll **20**. Each tape or belt has perforations therein and the drums **25** and **26** have projections **36** adjacent their ends for engaging the perforations of the belts or tapes.

Each belt is provided with three rows of characters thereon as shown at **37** in Figure 2, some of which will appear through the windows in the cover and others in the windows in the member **4**.

The characters on the belts may be arranged as follows. The belt on the left contains a column of consecutive numerals designated as "combination" or "serial" numbers reading from 01 to 99. Opposite are two additional columns of two-figure groups, each group being arbitrarily placed and each column of such groups arranged in three segments of thirty-three groups, thereby separating any two-figure group in the first column from any identical group in the second column by at least thirty-three groups at any one setting of the "combination" numbers. The right-hand belt also contains two columns of arbitarily placed two-figure groups staggered on the thirty-three group principle and to the right, an additional column of consecutive numerals designated as "combination" numbers reading from 01 to 99.

The cover may be moved vertically a distance equal to six groups of the columnar belt figures and the longest of the windows in the cover will only permit thirty-two groups of the columnar belt figures to be visible at any one setting of the "combination" numbers. The data on the cover may be engraved or written and may be numerals, amounts, quantities, dimensions, grades, types, etc., months, days of the week, alphabetical symbols or any other information deemed vital to the nature of the communications exchanged. The "serial" and "combination" numbers are visible through the windows **13** and **14**.

Each turn of either knob or the movement of the cover to any particular day of the week, results in a complete change of the columnar figure groups appearing at the windows in the cover in relation to the data appearing on the cover opposite such groups, thus producing a different arrangement of numerical values in relation to the data on the cover for each "serial number" for each day of the week and each setting of the "combination" numbers at the windows **13** and **14**.

The following will illustrate the application of the device in the case of a New York bank authenticating a message going to their Washington correspondents:

Monday, January 3rd

Message "serial" number 20.
To Washington Bank.
Charge our account and pay Clarence A. O'Brien $256,532.50.

(Signed) New York Bank.

Each device distributed by the New York bank is assigned two individual sets of "combination" numbers one set for messages to New York the other for messages from New York. Assuming that the "combination" 01—01 is assigned for messages from New York the New York operator moves the cover to the day of dispatch, being Monday, and disengages the belts by pulling out the top right-hand knob. The knob on the left is then turned until the first "combination" number 01 appears in the left hand box window and the right-hand knob turned until the second "combination" number 01 appears in the right-hand window. Both belts are then synchronized at this setting by pushing in the right-hand knob and revolved in unison until the "serial" number of the message, which is 20, appears in the left-hand window. An individual arrangement of numerical values in relation to the data on the cover is then ready to be applied to the message quoted above.

The authenticating figure group or "test" is calculated by adding the numerical values appearing in the windows opposite the data on the cover which correspond to the essential parts of the communication in this case being those underlined above.

Example

	Numerical value
January	68
3rd	48
1st letter of Clarence "C"	14
Middle initial "A"	48
1st letter of O'Brien "O"	73
Currency $ U. S	81
200,000	59
50,000	70
6,000	52
500	87
30	99
2	63

(Decimals and fractions disregarded)

"Test" 762

The "serial" number 20 is then joined to the "test" 762 and inserted as the first textword in the message, thus: 20762 Charge our account, etc.

On receipt of the message the Washington correspondent follows the same procedure as the New York operator, i. e., moves the cover to the day of dispatch, which is Monday, and synchronizes both belts at "combinations" 01—01. The belts are then rotated in unison until the "serial" number, which is 20, appears in the left-hand box window. The numerical values in relation to the data on the cover are then identical to those used by the New York operator and the reconciliation of the "test" proceeds as explained above. Should the total differ from the "test" 762 it is an indication that any of the following may have occurred: (1) an error has been made in transmission (2) miscalculation by the New York operator (3) contents has been tampered with or (4) the message is fraudulent.

By the use of this invention several thousand tapes or belts containing identical figure groups may be made at one printing, yet by setting the belts at the various "combination" numbers the equivalent of almost 10,000 completely separate and distinct variable authenticators are available.

Some present day printed authenticators provide a list of variable numbers to be added to the test on communications in the order in which they are sent, and no provision is made in the message itself to indicate to the receiver which of such numbers are employed. In other words, they are merely hidden numbers added to the sum of the fixed numerical values.

This would not be an objectionable feature should all the messages arrive in their proper sequence. However, they do not, due to several classes of communications, one taking precedence over the other in transmission, and to delays encountered by interruptions to the service, and especially at the present moment to delays in censorship, where such is imposed. It frequently occurs that messages employing this method of authenticating are received as much as ten num-

bers are out of sequence and it remains purely a matter of guesswork as to which of the variable numbers to apply to any particular message. Should an error in transmission occur in the "test" number, or the amount, the variable number selected might coincidentally verify the error, and result in the wrong amount being paid.

Due to the uncertainty of such an arrangement any message arriving out of sequence could not be safely acted upon until the sequence had been put into proper order and under present conditions this would frequently mean that several days accumulation of messages would exist before all the messages could be safely authenticated.

By using this invention however the "serial" number of the message automatically controls the arrangement of numerical values to be applied to each message and the sequence in which the "serial" numbers arrive is then of no importance.

Furthermore, ordinary printed authenticators in use today are usually in the form of a printed folder containing data similar to the cover of this invention but having fixed and permanent numerical values. One of these folders might easily be extracted from the files of an institution and its absence, in the case of an inactive correspondent, would not be discovered perhaps for several days.

By the use of this invention the possibility of the above would be eliminated as the device would be used for both active and inactive correspondents and must therefore be available continuously.

Inasmuch as present day authenticators contain the same numerical values for all holders and some only differ between holders by one numerical value, the "test" produced by such authenticators is subject to breakdown by any of the several holders since only one group of figures is necessary to complete the "test" and this group may be ascertained through the process of elimination. Whereas, with this invention each holder has two secret combination numbers permitting a different arrangement of numerical values for each of 99 messages for each of the six days of the week in one direction, and a similar variation in the opposite direction. With the inclusion of the dates of the month and the names of the months on the cover, a message instructing the payment of an amount of say $1,000 could be made to the same beneficiary 99 times a day and would always be authenticated by a different group of "test" figures until the same day of the week occurred again on the same day of the month which usually happens about every six years. From this it is apparent that with such a vast number of variations, a breakdown of the "test" figure group produced by this invention would be most difficult if not impossible.

This invention can be used for numerous purposes, such as the verification of formulas, measurements, parts of machinery, colors, sizes and lengths of lumber, grades of commodities, and in fact any information transmitted by telegraph, telephone or mail where it is important to guard against mistakes and where the authenticity of the message must be assured.

It is thought from the foregoing description that the advantages and novel features of the invention will be readily apparent.

It is to be understood that changes may be made in the construction and in the combination and arrangement of the several parts provided that such changes fall within the scope of the appended claims.

Having described the invention, what is claimed as new is:

1. In a device of the class described, a casing having an opening in its top, a sliding cover on the top of the casing covering the opening, means for holding the cover in adjusted position, a shield at the top of the casing having data thereon and the upper part of the cover having a window therein for displaying this data, windows in the shield adjacent the sides of the casing, longitudinally extending windows in the cover and indicia on the cover opposite the windows, a pair of rolls in the lower part of the casing, a pair of drums in the top part of the casing, belts carrying indicia passing over the drums and rolls, means for rotating the drums to bring the indicia on the belts into view at the windows in the cover and in the windows in the top member and means whereby the drums can be rotated individually or together.

2. In a device of the class described, a casing, a pair of axially aligned drums in one end of the casing, a shaft passing through a side of the casing and to which one drum is connected, a tubular shaft passing through the opposite side of the casing and to which the other drum is slidably but non-rotatably connected, the tubular shaft telescoping the other shaft and clutch means for detachably connecting the two shafts together when one shaft is moved inwardly.

3. A structure as recited in claim 1, wherein the sliding cover is moved in a step-by-step motion for setting up predetermined combinations of data on the shield and indicia on the cover and belts.

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