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3,481,446 12/1969 Burkhardt et al. 197/151
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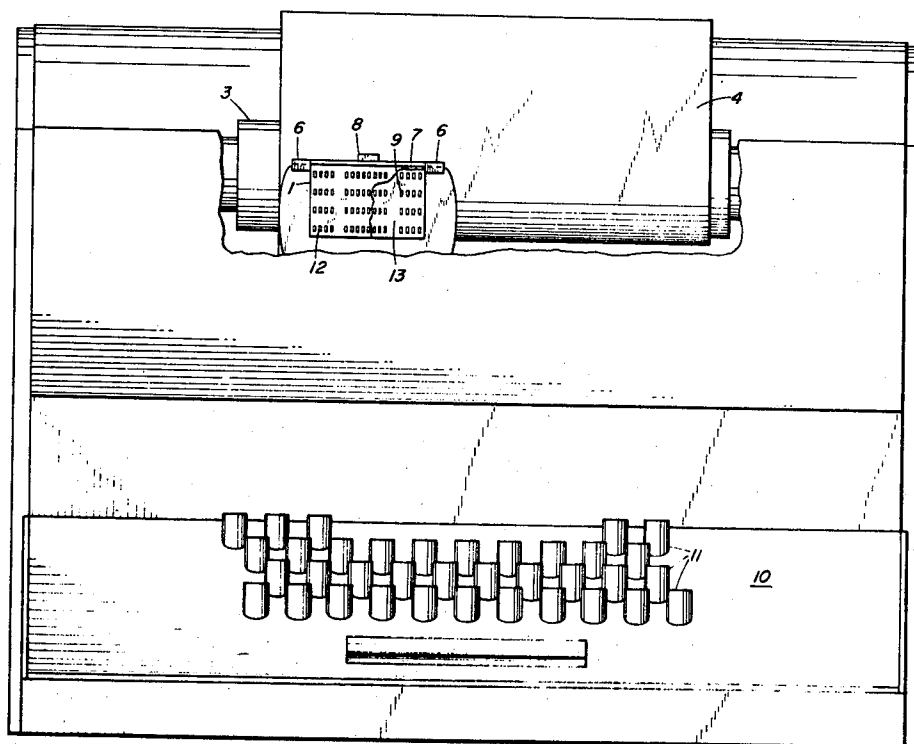
[54] **TYPEWRITER PRINTING MEANS FOR SYMBOLS IN CODED INKS**
6 Claims, 4 Drawing Figs.

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197/150, 197/153.5, 197/170, 197/172
[51] Int. Cl. **B41j 33/14,**
B41j 31/05, B41j 35/04
[50] Field of Search **197/151,**
150, 172, 170, 153.5; 346/105

[56] **References Cited**

UNITED STATES PATENTS
3,205,996 9/1965 Greenwood 197/151X

ABSTRACT: Symbols in coded inks in which the code in the presence or absence of photoluminescent constituents is effected on a modified teletypewriter mechanism by clipping onto the back of a standard teletypewriter type head a portion of ribbon with separate areas registering with the type heads, each area being impregnated with a coded ink having the proper presence or absence of coded photoluminescent components corresponding to the symbol of the type head. The areas are separated from each other somewhat, as is always the case with the teletypewriter head, and so contamination of the coded ink impregnated in one area with that in another area cannot take place. The teletypewriter head is provided with a clip frame and the inked ribbon portions are in suitable disposable frames which slide into the clip and are self-registering.



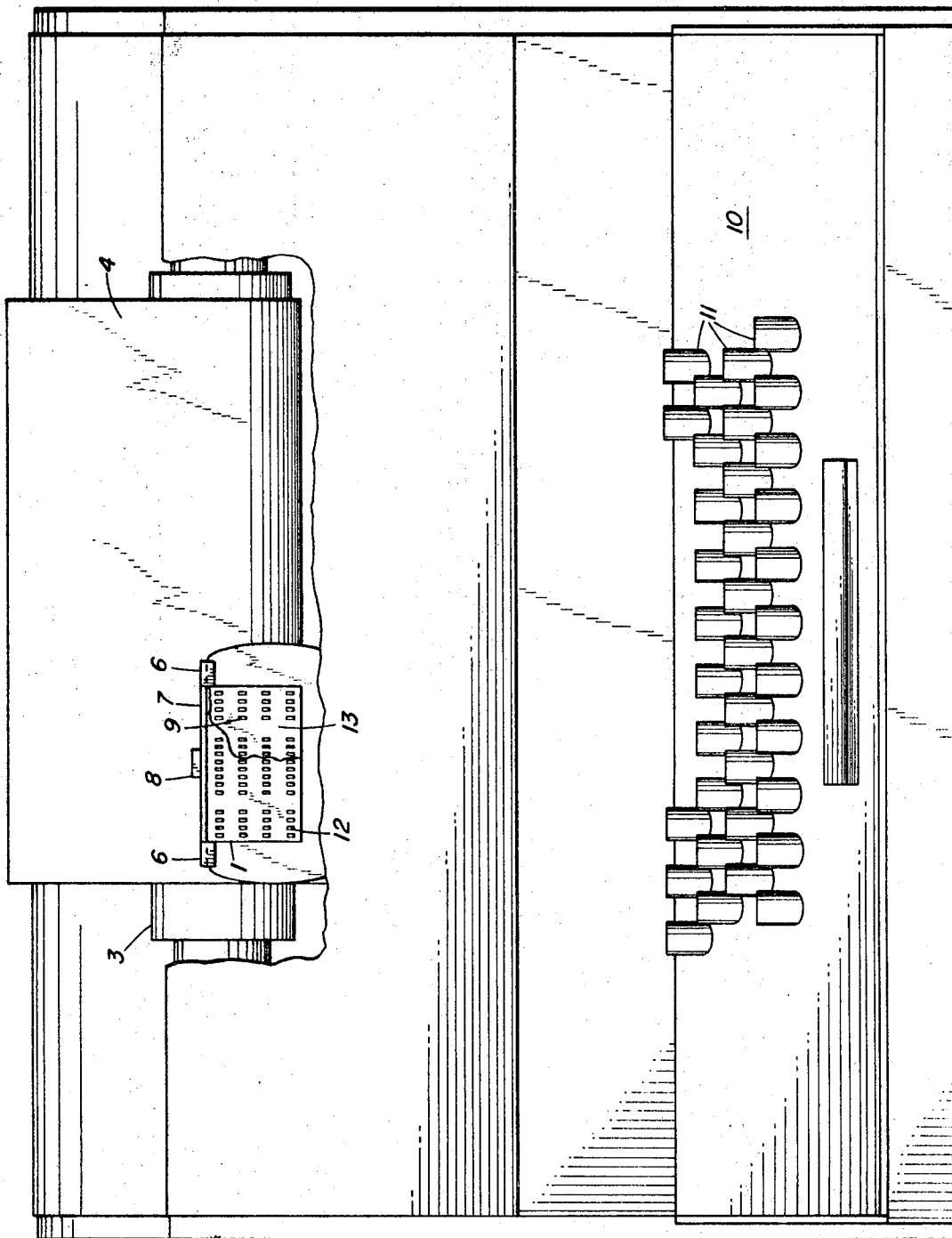


FIG. 1

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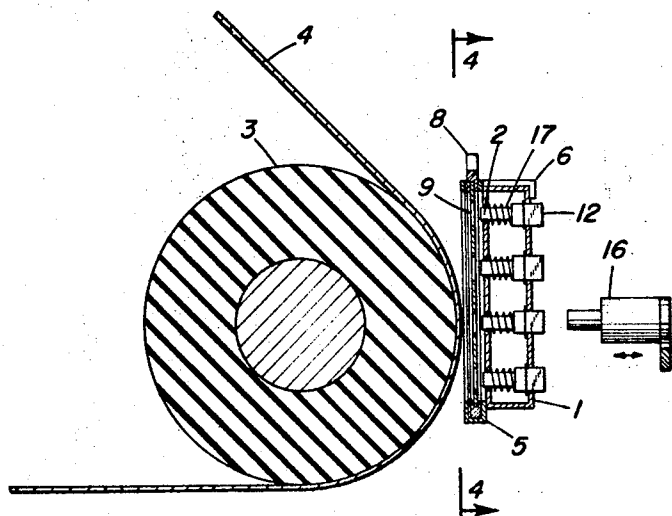


FIG. 2

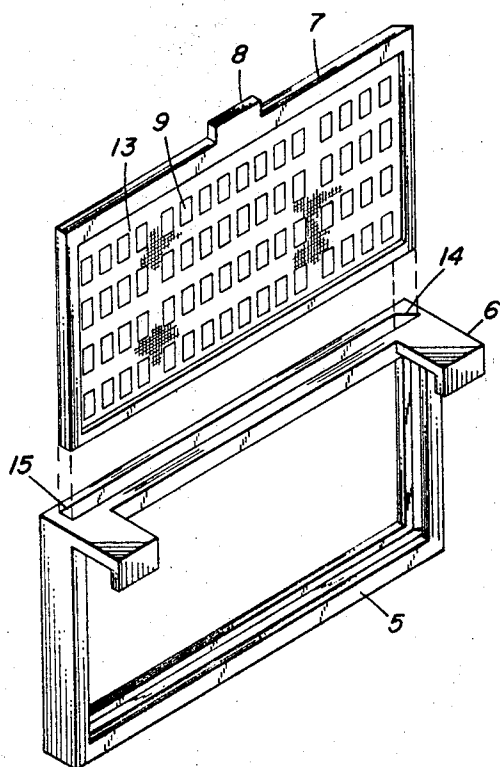


FIG. 3

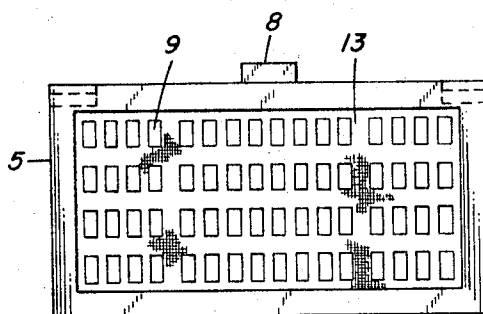


FIG. 4

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TYPEWRITER PRINTING MEANS FOR SYMBOLS IN CODED INKS

RELATED APPLICATIONS AND BACKGROUND OF THE INVENTION

Coded inks and coding of symbols, such as alpha numeric symbols, has been described and claimed in a number of applications assigned to the assignee of the present invention. In the Freeman and Halverson application Ser. No. 596,366, filed Oct. 14, 1966, and now U.S. Pat. No. 3,473,027, which application is a continuation-in-part of application Ser. No. 437,866, filed Mar. 8, 1965, and now abandoned, there is described a coding procedure and coding inks in which various symbols are represented by the absence or presence in at least one concentration of photoluminescent coding components, for example narrow band luminescers such as those containing lanthanide ions with an atomic weight greater than 57. A number of applications, assigned to the assignee of the present invention, have been filed for means for printing the symbols, for example the prior application of Postal, Ser. No. 560,321, filed June 24, 1966, which describes a modified typewriter with stylized typeface on lines of different photoluminescent components, the typeface opaqueing certain portions of the lines with the typed stylized symbols. This application and others have required rather special material or special modifications of typewriters or other devices.

The number of symbols which can be represented by presence or absence of components is $2^n - 1$, in which n is the number of coding components, or in the case of presence in two different concentrations, $3^n - 1$. The photoluminescent components are, in general, uncolored, and therefore, symbols can be represented which are secret and are only readable by illumination with ultraviolet light. It is also possible to have the symbols readable visually by incorporating in the inks a suitable pigment or coloring matter which can be seen under ordinary light.

One of the problems which arises in contamination of one coded ink by another. Where the photoluminescent efficiency of the photoluminescers is high, that is to say the amount of luminescing color for a given intensity of ultraviolet illumination, the problem is of little or no importance because contamination can be completely swamped. However, unfortunately, some of the best narrow-band fluorescers have only limited efficiency and so contamination of the inks in one symbol with those from another symbol can lead to spurious responses.

SUMMARY OF THE INVENTION

The present invention utilizes standard teletypewriters with a minor removable attachment, which is preferred, or somewhat more extensively modified typewriters of a similar operating type.

In an ordinary teletypewriter the type heads are arranged in a box with each type having its own spring-held actuating rod. For each symbol on striking the proper key in the teletypewriter the box is positioned so that a particular type head is opposite the typing position, a stationary platen, that is to say a platen which while it can turn does not move from right to left. The same mechanism which positions the type with respect to the platen also positions it with respect to a striking hammer, which is usually electrically operated and which is opposite the typing position. When a key is struck, the box moves to the proper position and then the hammer is actuated so that the particular type strikes through a conventional ribbon onto the paper. After each symbol is typed, the box moves one space to the right, so that when it is aligned for a symbol in this position by striking one of the keys the symbol is printing to the right, and so on until a line is filled, at which time the box is electrically returned to the left-hand margin and the platen is turned one line. Usually a teletypewriter operates with paper in the form of a continuous ribbon which is torn off when a message is completed, although this is not necessary and separate sheets may be used.

In an ordinary teletypewriter the ribbon is, of course, of a single color, as is the case with most ordinary typewriters, and the message is printed with the symbols readable visually, as in ordinary typewriting. Some simplified teletypewriters do not use upper and lower case and all letters are printed in capitals, but, as will be seen, from the standpoint of the present invention this is immaterial.

In the present invention the teletypewriter typing box is only slightly modified by clipping or otherwise removably attaching to its back a holder with a slot in which a frame carrying a piece of ribbon can be inserted. The holder is provided with guiding means so that a ribbon frame or portion of ribbon cannot be inserted in the wrong alignment. Of course the ordinary typewriter ribbon for the teletypewriter is removed. The typewriter ribbon in the frame is of a very special kind. It has areas aligning with each typeface on the teletypewriter typing head or box and each area is impregnated with a different coded ink the photoluminescent coding components of which correspond to the symbol on the type head. As the type heads on the ordinary teletypewriter box are somewhat separated, so are the areas on the ribbon, and contamination of one area with the other is, therefore, impossible, so that the problems due to coding contamination are completely eliminated. The typewriter ribbon is mounted in a suitable frame, which may be disposable, such as cardboard, or reusable, such as metal, and which holds the ribbon rigidly so that the alignment with the various type heads cannot be disturbed. The frame usually also is provided with a suitable tab which can be grasped by the fingers for replacement of the ribbon when impressions become too light. The ribbon frame fits in the holder so that there is a slight amount of play, permitting type faces to strike slightly different portions of each inked ribbon area to increase the number of impressions before a new frame or new portion of ribbon is inserted. The play should be sufficiently slight so that under no circumstances will misalignments of inked areas take place.

The coding components are, of course, photoluminescent, and, as is described in the Freeman and Halverson patent referred to above, it is desirable to use for at least some of the components narrow-band fluorescers containing lanthanide ions of atomic number greater than 57. It is also possible to have a broader-band fluorescer but normally only one such should be used. The particular lanthanide ions are not changed by the present invention nor in fact is any photoluminescent component so changed. This is an advantage of the present invention as it does not require the development of any new or different photoluminescent components. A large number of ribbons can be impregnated through suitable masks as, of course, the frames with the ribbons in have to be changed more often than an ordinary typewriter ribbon because they cannot move to expose fresh impregnated areas. However, the insertion of a frame with a new piece of ribbon is so simple and so quick that this does not constitute a significant problem.

Where the number of components which photoluminesce may be somewhat limited, as is often the case, it is possible to provide for a much larger number of coded symbols by also including some components which selectively reflect in the visible. However, it is usually preferable where possible to use coded inks in which all of the coding components are photoluminescent. As is described in the Freeman and Halverson patent, if it is desired to be able to read the typed symbols, a pigment may be incorporated in each area so that the symbols can be read visually.

While the preferred form of the present invention utilizes a teletypewriter without any change except for the particular ribbon frame holder on the back of the typing head or box, it is, of course, possible to use modified typewriters, for example those which movable platens, which does not require moving the typing head or box one unit to the right with each succeeding typing symbol. In such a case it is possible to have a continuous ribbon which is clipped on the back of the typing box or head with a sufficient slack for the movement of the box to align the particular type head which is chosen by the particu-

lar key struck on the teletypewriter keyboard. When a particular part of the ribbon has become worn, it may be advanced and a new area clipped in proper alignment to the back of the typing box. However, it is so simple to replace the frames with pieces of ribbon that in most cases it is preferred to utilize a teletypewriter machine which is not otherwise modified. In the preferred form where no modification of the teletypewriter is needed, this is an important advantage as, of course, the teletypewriter can be used for ordinary transmissions simply by unclipping the frame and replacing the normal teletypewriter ribbon. This is of advantage because it is not always necessary that all messages be in the photoluminescent code.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a diagrammatic elevation, partly broken away, of a teletypewriter equipped with the present invention;

FIG. 2 is a section through the platen and type box or head;

FIG. 3 is a detailed isometric of the frame clipped on the teletypewriter typing box and showing a frame with ribbon just before insertion; and

FIG. 4 is an elevation of the typing box with ribbon inserted, looking from the back, as shown by the arrow 4-4.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

As the teletypewriter is not changed except for the clip-on frame, only so much of the typewriter mechanism is illustrated as is necessary to understand where the elements of the present invention are attached.

FIG. 1 shows, in diagrammatic form, an elevation of a typical teletypewriter, for example a Model 28 unit of the Teletype Corporation, with keyboard 10 and keys 11. A portion of the typewriter is broken away so that the platen 3 shows, a typing box or head 1 and the forward clips 6 of the frame 7 carrying the typewriter ribbon 13 with the separate areas 9 aligning with the typing box types. The insertion handle 8 is also apparent in FIG. 1.

It should be noted that the breaking away includes breaking away a portion of the typing box itself so that the ribbon can be seen. This also breaks away the actuating hammer, which will be described in connection with some of the other figures. The operation of the teletypewriter machine is the normal one. When a key is struck the box 1 is aligned to bring a certain typeface corresponding to the key depressed in alignment with the typing position on the platen 3. The particular typeface is then struck with the hammer 16, which does not appear on FIG. 1 but is shown in FIG. 2. When the next key is struck, as is normal in a teletypewriter, the box moves one space to the right. That is to say, the box as a whole moves because, of course, when the next key is depressed this may be for a different symbol and so the box will have to be repositioned but the symbol appearing opposite a typing position will be one position to the right. This is standard teletypewriter mechanism and is not changed by the present invention. As has been stated above, the ribbon frame fits in the holder with a small amount of play. Slight movement of the impregnated ribbon areas results from the normal vibration of the machine during operation. FIG. 2 shows a section through the platen 3 with paper 4 and is also a section through the typing box, each of the typefaces 2 having an actuating rod with a face 12 which is struck by the hammer 16 when it is in alignment. Normally the types are in a retracted position by reason of the individual springs 17. This is, of course, standard teletypewriter design and this portion is not changed by the present invention.

FIG. 2 shows that a frame has been clipped with clips 6 onto the top of the type box. The frame, which is shown at 5, is provided with a slot the two sides of which are of different cross section, a triangular one at the right at 14 and a square one at the left at 15. The frame 5 extends down to the bottom of the type box, as appears in FIG. 2.

The ribbon 13 is mounted in the frame 5 and is provided with a series of separated rectangular areas 9 which align ac-

curately with the typefaces in the type box 1. The ribbon frame 7 has mating edges which are of the same shape as in the channels 14 and 15 in the slot of frame 5. It is thus impossible to insert the ribbon frame 7 incorrectly. When inserted, the ribbon appears as shown in FIG. 4, and each of the areas 9 is impregnated with a different coding ink, the coding components corresponding to the particular symbol on the type bars of the box 1. It will be noted that there is a separation between the areas 9 and therefore it is not possible for ink from one area to contaminate that of the other. When the ribbon is inked, of course it is through a suitable mask which prevents any contamination at that time.

When the teletypewriter is used with the present invention and a particular key is depressed, the type box 4 is moved so that the corresponding type head is in printing position, and of course the portion 9 of the ribbon is in the same position. Then the hammer 16 moves forward in the normal manner striking the head 12 of the rod on the particular type face 2 and an impression of the symbol in the particular coded ink results. The type box is then moved one space to the right and when the next key is struck it aligns the corresponding typeface one position to the right so that a line of typing is produced across the paper 4. As in standard teletype operation, which is not changed by the present invention, the platen is, of course, turned at the end of a line and the type box 1 is returned to its left-hand position to start a new line. Depending on whether the areas 9 of the ribbon have an additional pigment which is visible under visible light, the typed message will either be secret, because the coded inks are colorless, or will appear also in a suitable color for visual reading. One type of message can be changed to the other simply by inserting the proper ribbon frame 7. Some of these frames will have ribbons which do not have an additional pigment in the areas 9 and some will not. The possibility of typing either entirely secret messages which can only be deciphered under ultraviolet light illumination or those which are both readable visually and under ultraviolet illumination constitutes an important practical additional flexibility of the present invention.

The invention has been described in a typical example with a standard teletypewriter only slightly modified to take the ribbon frame holder. Other models of teletypewriters can be suitably slightly modified in a similar manner. It will be noted that the impregnated areas on the ribbons are rectangles with slight separation between areas. The particular shape of the areas is not important. They can be rectangles, circles, or any other suitable shape so long as they assure that misalignment will not take place.

I claim:

1. In a teletypewriter provided with keyboard and keys, a platen, a typing head movable to bring a predetermined typing head corresponding to the particular key depressed into printing position, and a hammer to cause this type head to move forward against the platen, the modification which comprises:

a. a removable holder attachable onto the type box of the teletypewriter and extending down the backface of said type box, the frame being provided with a slot and aligning edges; and

b. a separate frame carrying ribbon and mating with the aligning edges of the slot in said holder, the frame carrying a ribbon with discrete areas each with its own particular ink corresponding to a particular symbol, the ink having coding components of photoluminescent constituents and each area having the proper code for the particular symbol whereby when the ribbon frame is inserted, each area with its different coded ink is aligned with the corresponding typeface in the teletypewriter type box and typing results in the coded ink corresponding to the particular symbol of the particular key struck.

2. A modified teletypewriter according to claim 1 in which the ribbon-containing frame is provided with a tab or handle at the top.

3. A modified teletypewriter according to claim 1 in which the areas on the ribbon in the different coded inks are

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separated from each other with uninked zones so that contamination of one area having one coded ink with that from another is impossible.

4. A modified teletypewriter according to claim 2 in which the areas on the ribbon in the different coded inks are separated from each other with uninked zones so that contamination of one area having one coded ink with that from another is impossible.

5. A modified teletypewriter according to claim 1 in which

the inked areas on the ribbon in the frame carry in addition to the coding components a pigment which is visible under visible light illumination.

6. A modified teletypewriter according to claim 2 in which the inked areas on the ribbon in the frame carry in addition to the coding components a pigment which is visible under visible light illumination.

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