Dec. 4, 1962 J. J. SAYKAY 3,067,299

COMBINATION-CODE SIGNAL-GENERATING APPARATUS

Filed June 2, 1960 2 Sheets-Sheet 1

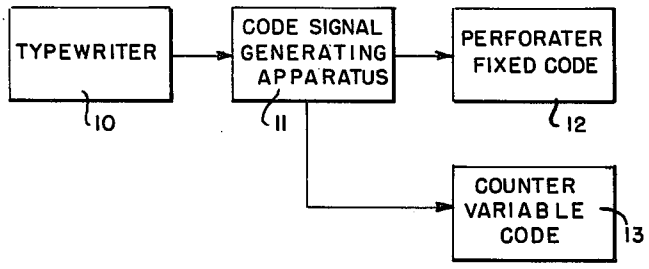


FIG. 1

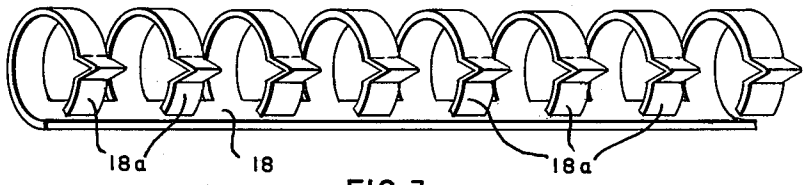


FIG. 3a

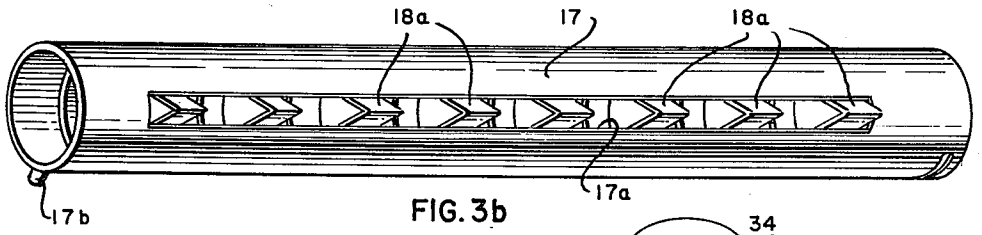


FIG. 3b

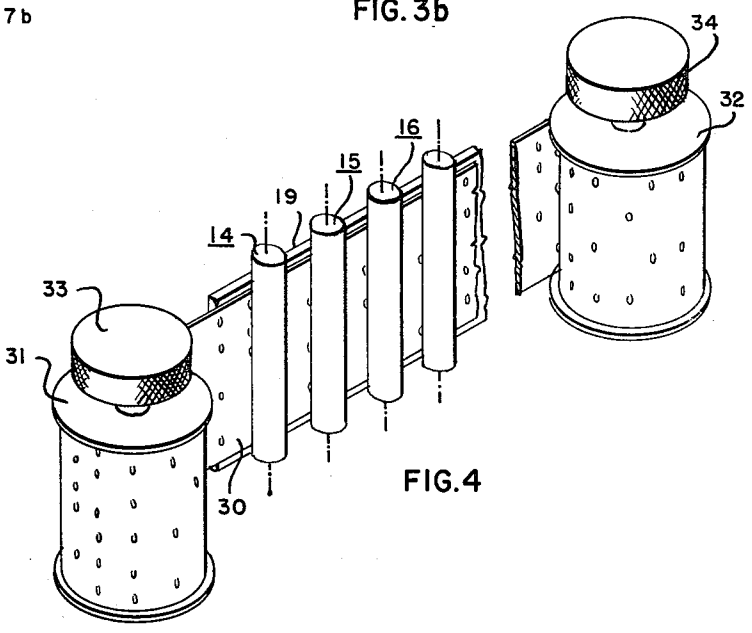


FIG. 4

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COMBINATION-CODE SIGNAL-GENERATING APPARATUS

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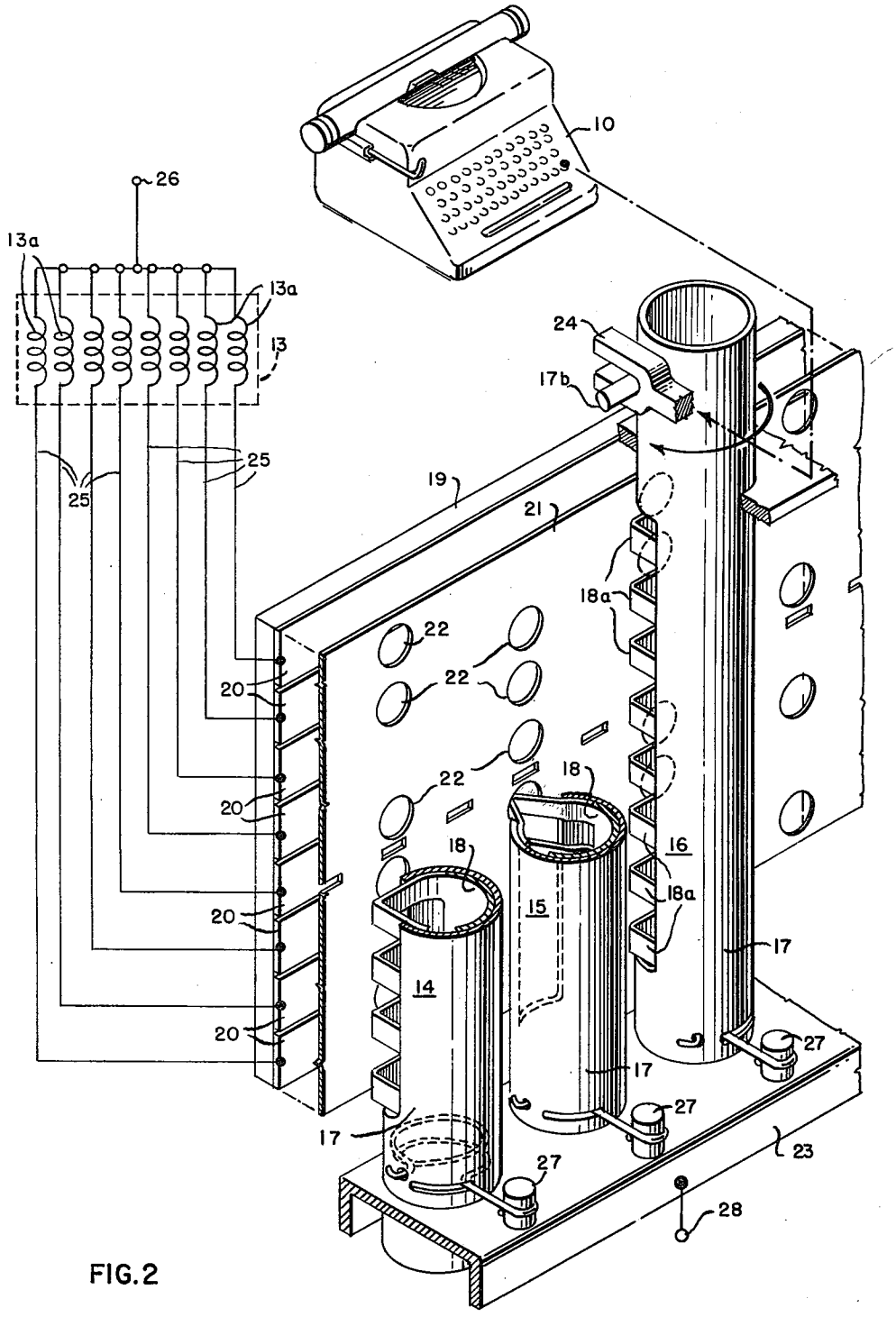


FIG. 2

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COMBINATION-CODE SIGNAL-GENERATING APPARATUS

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10 Claims. (Cl. 200—46)

This invention relates to combination-code signal-generating apparatus, sometimes referred to simply as an encoder, and, while it is of general application, it is particularly suitable for application to a key-operated device, such as a typewriter, utilized to impart to a continuous tape a coded representation of information "written" by the device.

Among the principal uses of such code tapes is the operation of automatic typesetting machines. In the operation of such machines, it is desirable to be able to set any of a number of different type fonts, the individual characters of which may have substantially different widths. It is also conventional to feed into such machines coded information for determining the intercharacter spaces and the inter-word spaces to provide justification of the lines of type. In prior mechanical types of typesetting machines, the change of one type font to another involved the changing of bulky and costly magazines of mechanical coding elements including the justifying spacing elements. In more recent tape-controlled typesetting devices, such a change of fonts has generally required the changing of complex and delicate coding elements of the switch bank of the encoder, usually in the form of printed circuit boards and the most elaborate multiple-circuit electrical connectors.

The present invention comprises a combination-code signal-generating apparatus or encoding apparatus for use in such systems in which the code can be changed readily and quickly without changing any of the mechanical or electrical connections of the encoding apparatus. The invention comprises also an improved form of coding element which, while of general application, is particularly suitable for use in the encoder of the invention.

It is an object of the invention therefore to provide a new and improved combination-code signal-generating apparatus which overcomes the above-mentioned limitations of prior encoding apparatus.

It is another object of the invention to provide a new and improved combination-code signal-generating apparatus by means of which the codes generated may be readily and quickly changed without the change of any bulky and costly mechanical or electrical coding mechanisms.

It is a still further object of the invention to provide a new and improved coding element which, while of general application, is particularly suitable for use in the encoding apparatus of the invention.

In accordance with the invention, a combination-code signal-generating apparatus comprises a plurality of pivotally mounted similar contact assemblies, each including a vertical row of n contact elements, corresponding ones of the contact elements of the assemblies being in horizontal alignment, and a stationary code strip comprising n horizontal conductive strips and a superimposed insulating mask having a desired code perforated therethrough and comprising n horizontal rows of aligned perforations disposed in vertical groups and in alignment with the conductive strips but normally out of registry with the vertical rows of contact elements. The apparatus also comprises means for rotating each of the contact assemblies in response to a different information-representative input, to register its contact elements with one of the vertical groups of perforations of the code strip, and a plurality of output conductors individually connected to the conductive strips. The terms "vertical" and "horizontal" are used herein and in the appended claims only as a simplified reference to two arrays which are substantially mutually perpendicular, irrespective of their actual orientation in space.

Further in accordance with the invention, in a combination-code signal-generating apparatus, a code-generating element comprises a pivotally mounted contact assembly including a vertical row of n elements and a stationary code element comprising n horizontal conductive strips and a superimposed insulating mask having a desired code perforated therethrough in the form of a vertical group of perforations in alignment with certain of the contact elements but normally out of registry therewith. The code-generating element further comprises means for rotating the contact assembly in response to an information-representative input, to effect a wiping registry of its contact elements with the exposed portions of the conductive strips, and a plurality of output conductors individually connected to the conductive strips.

For a better understanding of the present invention, together with other and further objects thereof, reference is had to the following description, taken in connection with the accompanying drawings, and its scope will be pointed out in the appended claims.

Referring now to the drawings:

FIG. 1 is a schematic block diagram of an encoding system to which the combination-code signal-generating apparatus of the invention is particularly applicable;

FIG. 2 is a schematic representation of a combination-code signal-generating apparatus embodying the invention;

FIGS. 3*a* and 3*b* are detailed perspective views of one of the contact assemblies embodied in the apparatus of FIG. 2; while

FIG. 4 is a schematic representation of an embodiment of an alternative form of the invention.

Referring now to FIG. 1 of the drawings, there is represented schematically a general code-generating and code-operated system to which the present invention is particularly applicable. This system comprises a key-operated device, such as a typewriter **10**, and a code-signal generating apparatus **11** having a plurality of code elements mechanically connected to be actuated by the individual keys of the typewriter **10**. The apparatus **11** controls two devices, the first a perforator of a fixed code, such as is used in selecting the keys or characters of a typesetting machine, and a counter or variable code device **13** which is used to determine the inter-character and inter-word spacing of the typesetting machine for the purposes of line justification. It will be understood that the several apparatuses of FIG. 1 are conventional, with the exception of the code-signal generating apparatus **11**, which is represented schematically in FIG. 2.

Turning now to FIG. 2, the combination-code signal-generating apparatus there represented comprises a plurality of pivotally mounted similar contact assemblies, one for each key of the typewriter device **10**. For the sake of clarity, only three, **14**, **15**, and **16** are shown. As shown more clearly in FIGS. 3*a* and 3*b*, each of the contact assemblies comprises an elongated housing **17** having a longitudinal slot **17***a* therein and an elongated conductive strip **18** in a substantially tubular form disposed therein. The strip **18** has a vertical row of n integral resilient contact elements **18***a*, **18***a* projecting through the slot **17***a*, where n is equal to the number of digits in the code to be utilized.

Disposed adjacent the contact assemblies **14**, **15**, and **16** is a stationary code strip comprising a rigid strip of insulation material **19**, which may be a thermosetting plastic material, having disposed thereon n horizontal

conductive strips **20**, one for each of the contact elements **18***a* of the vertical contact assemblies. Superimposed on the conductive strips of the code strip **19** is an insulating mask of thin insulation sheet material, such as paper strip **21**, which, for the sake of clarity, has been shown substantially displaced from the insulation strip **19** but, in practice, will be disposed in contact therewith or immediately adjacent thereto. The paper strip **21** has a desired code perforated therethrough in the form of *n* horizontal rows of aligned perforations **22** disposed in vertical groups, the horizontal rows being individually in alignment with the conductive strips **20** but normally slightly out of registry with the respective vertical rows of contact elements, as shown in the case of the contact assemblies **14** and **16**.

The combination-code signal-generating apparatus of FIG. 2 also comprises means for rotating each of the contact assemblies in response to an information-representative input, for example in response to actuation of a key of the typewriter **10**, to effect a wiping registry of its contact elements with the portions of the conductive strips **20** exposed through one of the vertical groups of perforations of the paper masking strip **21**. As represented schematically in FIG. 2, each of the contact assemblies **14**, **15**, **16** is pivotally mounted in the supporting frame, one portion **23** of which is shown, and each of the contact assemblies is provided with an actuating pin, such as the actuating pin **17***b* projecting from the housing **17** and connected by a mechanical linkage, represented schematically at **24**, to the operating mechanism of one of the keys of the typewriter **10**. The arrangement is such that as a key of the typewriter **10** is actuated, its respective contact assembly is rotated clockwise, as represented in FIG. 2, so that it effects a wiping action of the conductive strips **20** as they are rotated. In the final rotated position, as represented by the contact assembly **15** of FIG. 2, the contact elements **18***a* make contact with such of the conductive strips **20** as are exposed through the perforations **22** of the masking strip **21**.

The apparatus of the invention also comprises a plurality of output conductors **25** individually connected to the conductive strips **20** and interconnecting such strips with the actuating elements of an output device, shown as the variable code counter **13**, having a series of actuating electromagnets **13***a* having a common electrical terminal connection **26**. The contact elements **18***a* of the several contact assemblies are electrically interconnected through individual terminals **27** and the frame **23**, having an electrical terminal connection **28** forming, with the terminal **26**, the power supply terminals of the system.

The operation of the arrangement described will be readily apparent. As any key of the typewriter **10** is actuated, its respective contact assembly, such as one of the assemblies **14**, **15**, **16**, is rotated clockwise until its respective contact elements register with a vertical row of perforations **22** of the masking strip **21**, thus completing electrical connections to the respective ones of the output conductors **25** and the actuating elements **13***a* of the device **13** to effect the desired space-counting operation. If it is desired to change the type font in the typesetting machine to one in which the characters are of different widths, it then only becomes necessary to replace the paper masking strip with a differently coded masking strip corresponding to the width count of the changed type font. It will be apparent that the interchange of the inexpensive, lightweight, and simple masking strip **21** may be accomplished with much greater facility than the more complicated printed circuit boards or mechanical coding elements of prior encoding apparatus.

It will be apparent, however, that the encoding apparatus of the invention may also be used in connection with the fixed code perforator **12** of FIG. 1, in which case the several output conductors **25** are individually connected to the perforating magnets of the unit. It will also be noted that, in contradistinction to most combination-code signal-generating apparatus in which the code strip or card is movable while the sensing elements are stationary, in the present invention the reverse relationship obtains, that is, the code strip **19** and its superimposed masking strip **21** remain stationary in operation while the contact assemblies, which are much smaller and lighter and more readily controlled, are movable to perform the sensing operation.

It will also be understood that the tape produced by the perforator **12** generally has a series of sprocket feed holes in the center or on either boundary. As shown, the vertical groups of code perforations are spaced by two feed holes. When utilizing the present invention, an additional series of code perforations may be interposed between the perforations shown in FIG. 2 and separated therefrom by the distance of one feed hole of the resulting punched tape. By then merely shifting the masking strip **21** by the distance between adjacent feed holes of the punched tape, the resulting code signal generated by the apparatus may be shifted from one code to another. For example, one code may be representative of lower case letters and characters of a typesetting machine and the other code the upper case letters and characters of the machine. Then the appropriate codes for lower case and upper case characters may be selectively generated merely by shifting the masking strip **21** by the distance between adjacent feed holes. Such a shift of the masking strip **21** may be effected by the mechanism shown in FIG. 4, described hereinafter.

It will be understood that the fixed code perforator **12** and the variable code counter **13** of FIG. 1 may be entirely conventional and they are shown schematically since they form no part of the present invention. However, these devices may be of the types disclosed in Patent No. 2,059,250 to Krum.

Referring now to FIG. 4, there is represented a modification of the invention in which the signal-generating apparatus includes a movable masking strip **30** disposed immediately adjacent the code strip **19** and with its horizontal rows of perforations in alignment with the horizontal rows of contact elements of the contact assemblies **14**, **15**, **16**, etc. The masking strip **30** includes a plurality of different codes in sequence and the arrangement includes means for relatively moving the masking strip **30** and the code strip **19** to select a desired code. For example, there may be provided a pair of winding reels **31** and **32** on which the masking strip **30** is disposed. The reels **31** and **32** are provided with manually operable knobs **33** and **34**, respectively, for effecting movement of the masking strip **30** in either direction past the code strip. By suitably operating the knobs **33** and **34**, the reels **31** and **32** may be rotated to bring a desired code in registry with the code strip **19**. The modification of the invention represented in FIG. 4 is thus particularly suitable for generating a code signal for a variable code counter, such as the counter **13** of FIG. 1.

While there have been described what are at present considered to be the preferred embodiments of the invention, it will be obvious to those skilled in the art that various changes and modifications may be made therein without departing from the invention, and it is, therefore, aimed in the appended claims to cover all such changes and modifications as fall within the true spirit and scope of the invention.

What is claimed is:

1. A combination-code signal-generating apparatus comprising: a plurality of pivotally mounted similar contact assemblies, each including a vertical row of *n* contact elements, corresponding ones of the contact elements of said assemblies being in horizontal alignment; a stationary code strip comprising *n* horizontal conductive strips and a superimposed insulating mask having a desired code per-

forated therethrough and comprising *n* horizontal rows of aligned perforations disposed in vertical groups and in alignment with said conductive strips but normally out of registry with said vertical rows of contact elements; means for rotating each of said contact assemblies in response to a different information-representative input to register its contact elements with one of the vertical groups of perforations of said code strip; and a plurality of output conductors individually connected to said conductive strips.

2. A combination-code signal-generating apparatus for actuation by a key-operated device comprising: a plurality of pivotally mounted similar contact assemblies, one for each key of the device, each of said assemblies including a vertical row of *n* contact elements, corresponding ones of the contact elements of said assemblies being in horizontal alignment; a stationary code strip comprising *n* horizontal conductive strips and a superimposed insulating mask having a desired code perforated therethrough and comprising *n* horizontal rows of aligned perforations disposed in vertical groups and in alignment with said conductive strips but normally out of registry with said vertical rows of contact elements; means for rotating each of said contact assemblies in response to actuation of a different key of the device to register its contact elements with one of the vertical groups of perforations of said code strip; and a plurality of output conductors individually connected to said conductive strips.

3. A combination-code signal-generating apparatus comprising: a plurality of pivotally mounted similar elongated conductive strips, each including a vertical row of *n* integral projecting resilient contact elements, corresponding ones of the contact elements of said assemblies being in horizontal alignment; a stationary code strip comprising *n* horizontal conductive strips and a superimposed insulating mask having a desired code perforated therethrough and comprising *n* horizontal rows of aligned perforations disposed in vertical groups and in alignment with said conductive strips but normally out of registry with said vertical rows of contact elements; means for rotating each of said contact assemblies in response to a different information-representative input to register its contact elements with one of the vertical groups of perforations of said code strip; and a plurality of output conductors individually connected to said conductive strips.

4. A combination-code signal-generating apparatus comprising: a plurality of pivotally mounted similar contact assemblies, each including a vertical row of *n* contact elements, corresponding ones of the contact elements of said assemblies being in horizontal alignment; a stationary code strip comprising a rigid strip of insulation material having disposed thereon *n* horizontal conductive strips and a superimposed insulating mask of thin insulating sheet material having a desired code perforated therethrough and comprising *n* horizontal rows of aligned perforations disposed in vertical groups and in alignment with said conductive strips but normally out of registry with said vertical rows of contact elements; means for rotating each of said contact assemblies in response to a different information-representative input to register its contact elements with one of the vertical groups of perforations of said code strip; and a plurality of output conductors individually connected to said conductive strips.

5. A combination-code signal-generating apparatus comprising: a plurality of similar contact assemblies, each including a vertical row of *n* contact elements, corresponding ones of the contact elements of said assemblies being in horizontal alignment; a stationary code strip comprising a rigid strip of insulation material having disposed thereon *n* horizontal conductive strips; a movable masking strip disposed immediately adjacent said strip and including a plurality of different codes perforated therethrough, each code comprising *n* horizontal rows of aligned perforations disposed in vertical groups and in alignment with said conductive strips but normally out of registry with said vertical rows of contact elements; means for moving each of said contact assemblies in response to a different information-representative input to register its contact elements with one of the vertical groups of perforations of said code strip; means for relatively moving said masking strip and said code strip to select a desired code; and a plurality of output conductors individually connected to said conductive strips.

6. A combination-code signal-generating apparatus comprising: a plurality of similar contact assemblies; each including a vertical row of *n* contact elements, corresponding ones of the contact elements of said assemblies being in horizontal alignment; a stationary code strip comprising a rigid strip of insulation material having disposed thereon *n* horizontal conductive strips; a movable masking strip disposed immediately adjacent said strip and including a plurality of different codes perforated therethrough, each code comprising *n* horizontal rows of aligned perforations disposed in vertical groups and in alignment with said conductive strips but normally out of registry with said vertical rows of contact elements; a pair of winding reels on which said masking strip is disposed for movement past said code strip in either direction; means for moving each of said contact assemblies in response to a different information-representative input to register its contact elements with one of the vertical groups of perforations of said code strip; means for actuating said reels to bring a desired code in registry with said code strip; and a plurality of output conductors individually connected to said conductive strips.

7. In a combination-code signal-generating apparatus, a code-generating element comprising: a pivotally mounted contact assembly including a vertical row of *n* elements; a stationary code element comprising *n* horizontal conductive strips and a superimposed insulating mask having a desired code perforated therethrough in the form of a vertical group of perforations in alignment with certain of said contact elements but normally out of registry therewith; means for rotating said contact assembly in response to an information-representative input to effect a wiping registry of its contact elements with the exposed portions of said conductive strips; and a plurality of output conductors individually connected to said conductive strips.

8. In a combination-code signal-generating apparatus, a code-generating element comprising: a contact assembly comprising an elongated conductive strip including a vertical row of *n* integral projecting resilient contact elements; a stationary code element comprising *n* horizontal conductive strips and a super-imposed insulating mask having a desired code perforated therethrough in the form of a vertical group of perforations in alignment with certain of said contact elements but normally out of registry therewith; means for rotating said contact assembly in response to an information-representative input to effect a wiping registry of its contact elements with the exposed portions of said conductive strips; and a plurality of output conductors individually connected to said conductive strips.

9. In a combination-code signal-generating apparatus, a code-generating element comprising: a contact assembly comprising a pivotally mounted elongated housing having a longitudinal slot therein and an elongated substantially tubular conductive element disposed therein having a vertical row of *n* integral resilient contact elements projecting through said slot; a stationary code element comprising *n* horizontal conductive strips and a superimposed insulating mask having a desired code perforated therethrough in the form of a vertical group of perforations in alignment with certain of said contact elements but normally out of registry therewith; means for rotating said contact assembly in response to an information-representative input to effect a wiping registry of its contact elements with the exposed portions of said conductive strips; and a plurality of output conductors individually connected to said conductive strips.

10. In a combination-code signal-generating apparatus, a code-generating element comprising: a contact assembly including a vertical row of *n* elements; a stationary code element comprising a rigid strip of insulation material having disposed thereon *n* horizontal conductive strips and a superimposed insulating mask of thin insulating sheet material having a desired code perforated therethrough in the form of a vertical group of perforations in alignment with certain of said contact elements but normally out of registry therewith; means for rotating

said contact assembly in response to an information-representative input to effect a wiping registry of its contact elements with the exposed portions of said conductive strips; and a plurality of output conductors individually connected to said conductive strips.

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