

April 18, 1961

T. REUMERMAN ET AL

2,980,801

TRANSLATION OF SYMBOLS INTO ELECTRIC SIGNALS

Filed Feb. 5, 1957

2 Sheets-Sheet 1

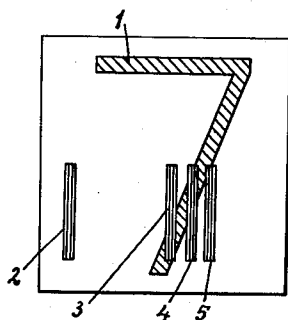


FIG. 1

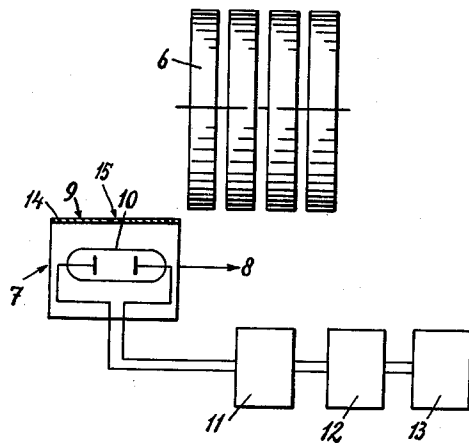


FIG. 2

April 18, 1961

T. REUMERMAN ET AL

2,980,801

TRANSLATION OF SYMBOLS INTO ELECTRIC SIGNALS

Filed Feb. 5, 1957

2 Sheets-Sheet 2

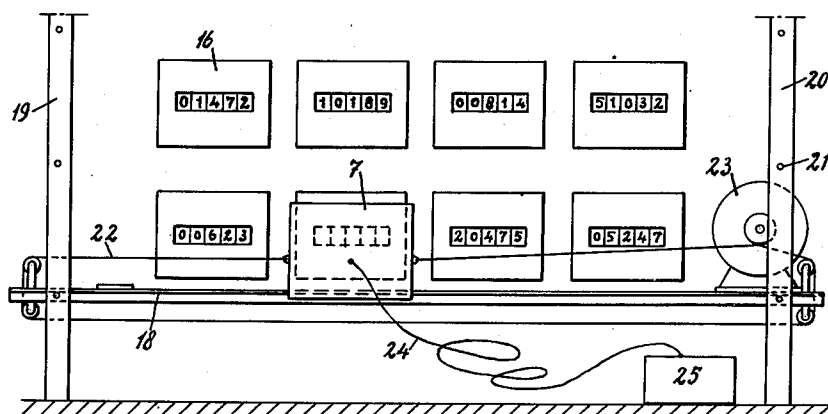


FIG. 3

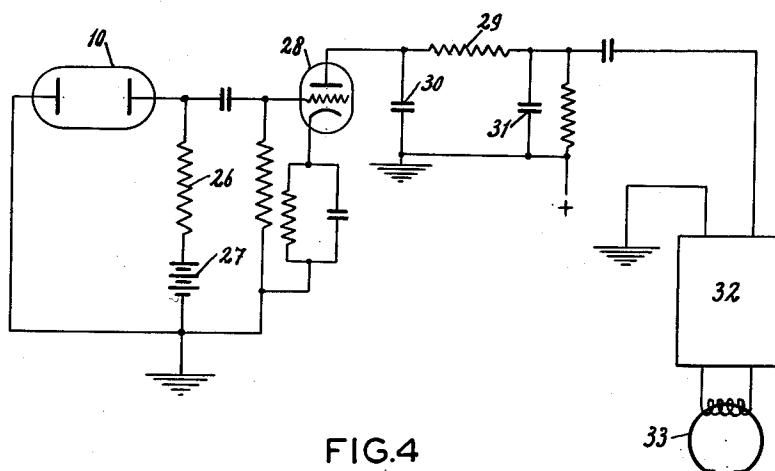


FIG. 4

1

2,980,801

TRANSLATION OF SYMBOLS INTO ELECTRIC SIGNALS

Theodorus Reumerman, 12 Zandvoortselaan, Zandvoort,
and Willem Hendrik Theodorus Helmig, 9 Van Slingelandtlaan, Leiden, Netherlands

Filed Feb. 5, 1957, Ser. No. 638,344

Claims priority, application Great Britain Feb. 6, 1956

14 Claims. (Cl. 250-106)

The invention relates to the translation into electric signals of symbols appearing on the movable symbol fields of an indicating mechanism, such as a counter of the kind used in adding, calculating and accounting machines, or of the kind used in electricity meters, subscribers' meters in telephone exchanges, and the like.

Symbol groups appearing on indicating mechanisms are usually interpreted by visual reading. Where subsequent processing of the readings by means of electric machines is required, the readings must be translated into electric signals. This may be done either directly, by operating an entering device, such as a keyboard, or indirectly, by operating a recording device which prepares a machine controlling record, such as a magnetic tape or a punched card. In the latter case, the electric signals are generated when the record is sensed by the machine.

Errors in the reading of the symbol groups, or in the operation of the entering or recording device, lead to inaccurate results. Such errors may be avoided by eliminating the human element in the above-described processes. For this purpose, the symbols must be represented in a form which is readily translatable into electric signals.

It is the object of the present invention to provide improved means for this kind of symbol representation and for the translation of the represented symbols into electric signals.

According to the invention, at least part of the movable symbol fields of an indicating mechanism are each provided with a spot, or with a plurality of spots of a radio-active material, in such manner that the location of the spot, or the pattern of the plurality of spots corresponds according to a predetermined code with a numerical value identifying the symbol.

Suitable materials for the spots are radio-active isotopes with a sufficiently long half-life period, for instance strontium or thallium isotopes. The spots may be arranged either on the part of the symbol fields that is taken up for the visual representation of the symbol, or on a separate part of the symbol fields. The spots may have any desired shape; for instance, circular spots may be used, or elongated spots in the form of parallel straight lines. In a preferred embodiment of the invention, the spots are arranged in depressions of the surface of the symbol fields, so that a directional radiation is obtained.

When a symbol group appearing on said indicating mechanism is scanned by an electric scanning device responsive to the radiation of the radio-active spots, the output current of this device will comprise a series of impulses corresponding with the numerical values of the symbols according to said code. These impulses may be filtered out and used for controlling an electric machine for processing the symbol group, or a recording device for preparing a machine controlling record, such as a magnetic tape.

In a suitable embodiment of the invention, the scanning device is responsive to the ionisation of a gas caused

2

by the radiation of the radio-active spots. This may be a gas occluded in an air-tight envelope, such as a tube of the Geiger-Müller type, or it may be the air in the vicinity of the symbol field. When the radiation of one of the radio-active spots is intercepted by the scanning device, an electric current will flow between electrodes arranged in the gas and carrying a suitable voltage, and this current may be amplified and used for controlling a machine or a recording device. Where a tube of the Geiger-Müller type is used, the current will consist of a plurality of impulses each corresponding with one of the radiation quanta, and these impulses may be integrated by suitable integrating means in order to obtain the desired code impulse. A screen impermeable to the radiation of the radio-active spots and provided with a suitable intercepting aperture, for instance with an elongated slit, may be provided between the symbol fields and the electrodes, so that the ionisation of the gas between the electrodes may only be caused by the radiation of a spot arranged immediately opposite the aperture. By continuously moving the electrodes and the screen past the various symbol fields, the scanning device will successively respond to the spots on the symbol fields, so as to produce an impulse series corresponding with the numerical values of the symbols displayed on the symbol fields.

It is not always necessary to provide radio-active spots on all the symbol fields of an indicating mechanism. For instance, in some kinds of electricity meters, the counter displays in addition to the digits representing the units, tens, hundreds, etc. of the consumed amount, a digit representing tenths of a kwh. which is not used in the calculation of the amount to be paid. In this case, the spots may be left out on the wheel displaying the tenths of a kwh. In general, the spots are provided on all symbol fields that are significant from the point of view of processing.

Any suitable code may be used for the representation of the symbols by means of the radio-active spots. Some examples are a binary code, a biquinary code, the international five element code, and the self-correcting seven element code.

The spots representing the code elements may be preceded or followed by auxiliary spots serving to determine the exact location of the code element spots. For instance, the code element spots may be preceded by a starting spot determining the exact location of the first code element spot.

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

Fig. 1 represents a symbol field provided with radio-active spots, and

Fig. 2 schematically represents a scanning device.

Fig. 3 illustrates the use of the scanning device as shown in Fig. 2 for reading a set of conversation meters in a telephone exchange.

Fig. 4 shows the circuit diagram of the device shown in Fig. 2.

The symbol field represented in Fig. 1 constitutes a part of the surface of a counter wheel, and comprises a visual representation 1 of the digit "7." Slots or incisions 2, 3, 4 and 5 are provided in the surface of the symbol field, and each of these incisions is filled up with a radio-active material, so that four rectilinear elongated radio-active spots are obtained. The lateral radiation of the radio-active material is absorbed by the material of the counter wheel, so that a directional effect is obtained by the use of the incisions. The spot in incision 2 is a starting spot serving to determine the exact location of the first code spot. The spots in incisions 3, 4 and 5 are the code spots, and represent the numerical value "7" according to the usual binary code.

In Fig. 2 a plurality of counter wheels are indicated at 6. A scanning carriage 7 may be moved past the wheels 6 in the direction indicated by the arrow 8. For this purpose, suitable guiding means are provided in front of the counter.

A screen 14, placed behind the front wall 9 of the scanning carriage, is made of a material which is impermeable to the radiation of the radio-active spots and is provided with a suitable intercepting aperture 15, preferably in the shape of an elongated vertical slit. As the carriage 7 moves past the counter wheels, the radio-active spots are successively brought before this aperture, so that they may influence the Geiger-Müller tube 10 arranged behind the screen 14.

The current impulses generated by the tube 10 are amplified by an amplifier 11, integrated by an integrating network 12, and supplied to a tape recorder 13, in which the numerical values of the symbols appearing on the counter wheels 6 are recorded according to the binary code.

Fig. 3 illustrates the use of the scanning device shown in Fig. 2 for reading a set of conversation meters in a telephone exchange. The meters 17, each individual to one of the subscribers, are arranged in horizontal rows in the usual manner. Although only four meters in each row have been shown for purposes of illustration, it will be understood that the number of meters in each row may be larger in actual practice.

The digit fields on the wheels of the meters are provided with radio-active spots in the manner shown in Fig. 1.

A bridge 18 is placed before the meters and is supported by columns 19 and 20. As schematically indicated at 21, this bridge may be adjusted to various levels, so that it may cooperate with any desired row of meters. The scanning carriage 7 is adapted to be moved along the bridge by means of an endless cable 22, driven by a motor 23, and is coupled by means of a flexible electric cable 24 with a box 25 containing the remaining apparatus (parts 11, 12 and 13 as shown in Fig. 2).

In operation, the bridge 18 is successively placed before each row of meters, and the scanning carriage 7 is moved across each row in order to register the readings of the meters. During the backward movement of the carriage, the electric circuit of the scanning device is switched off, so that no recordings are made.

Fig. 4 shows the circuit of the scanning device more in detail. The Geiger-Müller tube 10 is connected through a resistor 26 with a suitable voltage source 27. The impulses appearing across resistor 26 are fed to the control grid of an amplifier tube 28. The anode current of this tube is fed to an integrating network, comprising a resistor 29 and two condensers 30 and 31. The output voltage of this network is fed to the input terminals of an amplifier 32 of conventional design, which feeds the magnet head of a tape recorder.

It will be understood that the impulses generated by the Geiger-Müller tube, each corresponding to one of the radiation quanta, are integrated by network 29-31, so that code impulses corresponding with the numerical values of the digits displayed on the meters are supplied to the magnet head 33.

Although the invention has been explained hereinbefore with reference to a specific embodiment thereof, it is to be understood that various modifications may be applied thereto within the scope of the invention as set forth in the claims.

We claim:

1. An indicating mechanism comprising a counter including at least one movable symbol carrier having a plurality of symbol fields in predetermined relation and bearing different symbols each representing a different unit of information from an information code, wherein at least part of the said symbol fields include at least one

spot of a radio-active material the location of which corresponds and identifies with the symbol on the field.

2. An indicating mechanism comprising a counter including at least one movable symbol carrier having a plurality of symbol fields in predetermined relation and bearing different symbols each representing a different unit of information from an information code, wherein at least part of the said symbol fields includes spots of a radio-active material grouped in a pattern which corresponds and identifies with the symbol on the associated field.

3. An indicating mechanism as claimed in claim 2, wherein the fields define depressions and the said spots are arranged in said depressions.

4. An indicating mechanism as claimed in claim 2, wherein the spots consist of a radio-active isotope having a long half-life.

5. An indicating mechanism as claimed in claim 2, wherein visual representations and the spots are arranged on the same parts of the symbol fields.

6. An indicating mechanism as claimed in claim 2, wherein the spots are parallel straight lines.

7. Apparatus for translating symbols into electric signals, comprising a counter, at least one movable symbol carrier in said counter and including a plurality of symbol fields in fixed and predetermined relation and at least partially provided with spots of a radio-active material grouped in a pattern corresponding to a predetermined code identifying the symbol on each field, a scanning device for converting the radiation of the said radio-active spots into impulses, and means to process the impulses.

8. Apparatus as claimed in claim 7, wherein the scanning device is responsive to the ionisation of a gas caused by the radiation of the said radio-active spots.

9. Apparatus as claimed in claim 8, wherein said scanning device comprises a Geiger-Müller tube.

10. Apparatus as claimed in claim 9, further comprising an integrating network for deriving the desired code impulses from the impulses corresponding with the radiation.

11. Apparatus as claimed in claim 9, further comprising a screen impermeable to the radiation of the said radio-active spots, interposed between said Geiger-Müller tube and the said symbol fields, and provided with an intercepting aperture.

12. Apparatus as claimed in claim 11, further comprising means for moving said screen and said Geiger-Müller tube past the symbol fields of said indicating mechanism.

13. Meter apparatus for indicating metered magnitudes comprising means including a sequence of coded radio-active representations for representing all of said magnitudes, means for moving the radioactive representation of the metered one of said magnitudes to a determinable position, and means to convert the radioactive representation at said determinable position into an electrical signal representing said metered magnitude.

14. An indicating mechanism comprising a counter including at least one movable symbol carrier having a plurality of symbol fields in predetermined relation and bearing different symbols each representing a different unit of information from an information code, wherein at least part of the said symbol fields includes spots of a radio-active material grouped in a pattern which corresponds and identifies with the symbol on the associated field and at least one auxiliary spot of a radio-active material serving to locate the first-mentioned spots.

References Cited in the file of this patent

UNITED STATES PATENTS

2,346,043	Mysels	Apr. 4, 1944
2,474,271	Meyer	June 28, 1949
2,683,813	Friedman	July 13, 1954
2,773,196	Hall	Dec. 4, 1956