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Cayla

[11] **3,741,112**

[45] **June 26, 1973**

[54] **UNIT FOR TRANSLATING AND PRINTING OF DATA SUPPLIED IN A FORM OF COMBINATIONS OF BINARY SIGNALS**

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[22] Filed: **May 11, 1972**

[21] Appl. No.: **252,304**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 849,044, Aug. 11, 1969, abandoned.

[52] **U.S. Cl.** .... **101/93 C**

[51] **Int. Cl.** **B41j 1/60**

[58] **Field of Search** .... 101/93 C, 93 R, 110, 101/92, 96; 235/61.9

[56] **References Cited**

UNITED STATES PATENTS

2,720,832	10/1955	Luning	101/93 C
2,796,830	6/1957	Hilton	101/93 C
2,862,389	12/1958	Potter	74/479
2,864,307	12/1958	Hilton et al.	101/93 C
2,867,167	1/1959	Roth	101/93 C
3,025,510	3/1962	Lovejoy	74/479
3,120,801	2/1964	Davies et al.	101/93 C
3,176,610	4/1965	Benson	101/93 C
3,277,817	10/1966	Yeiser	101/93 C
3,280,256	10/1966	Clark et al.	178/79
3,304,366	2/1967	Clark et al.	178/23 R
3,385,213	5/1968	Stephan	101/110
3,419,678	12/1968	Ariel	178/23 R
3,465,866	9/1969	Gehring et al.	235/61.9

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[57] **ABSTRACT**

This disclosure relates to a unit for translating and printing data supplied as combinations of binary signals delivered respectively on different lines of a group of conductors. The signals are split up on each line into trains of pulses whose durations double from one line to another in geometric progression. Printing means are provided with a plurality of printing characters. Collector means (having the group of conductors coupled thereto) combine the pulses into a joined configuration. Clutching means are connected to an output line of a collector means for clutching the printing means to a rotatable drive shaft so as to position the printing characters in juxtaposed relation with an article to be printed.

13 Claims, 9 Drawing Figures

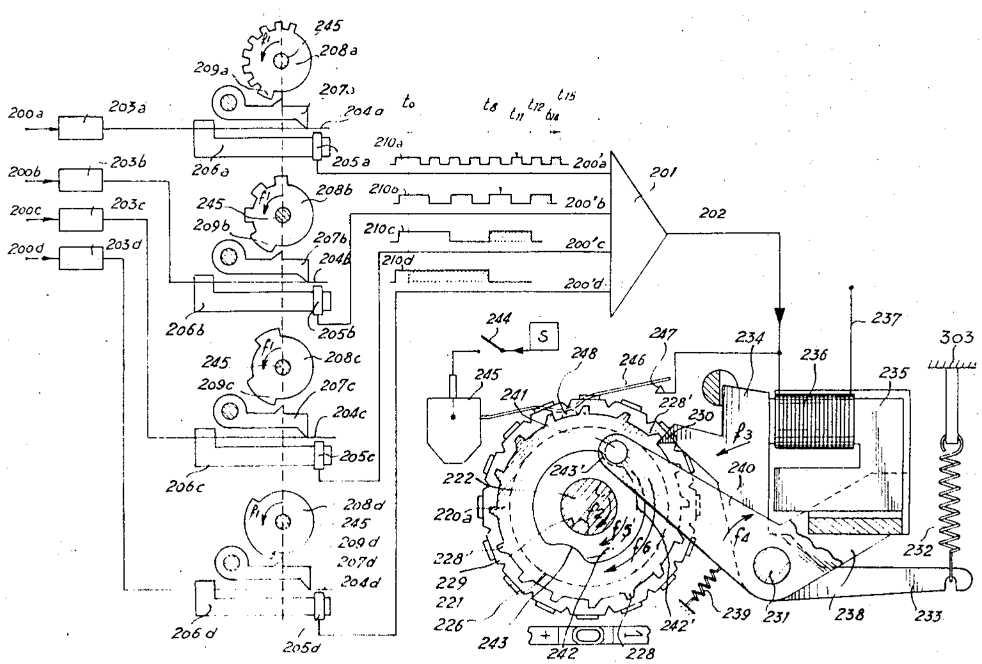


Fig.1

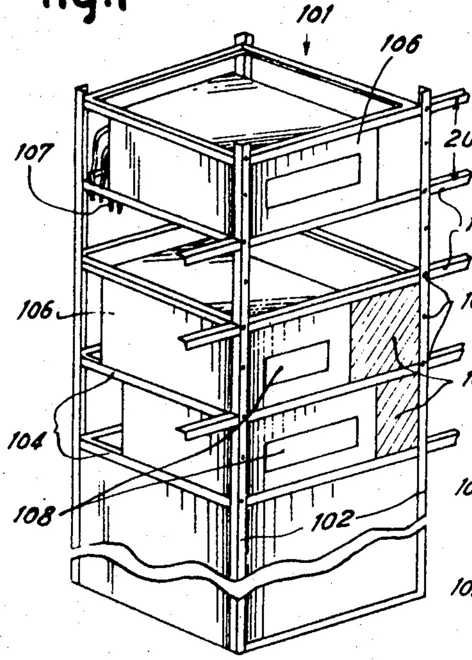


Fig.2

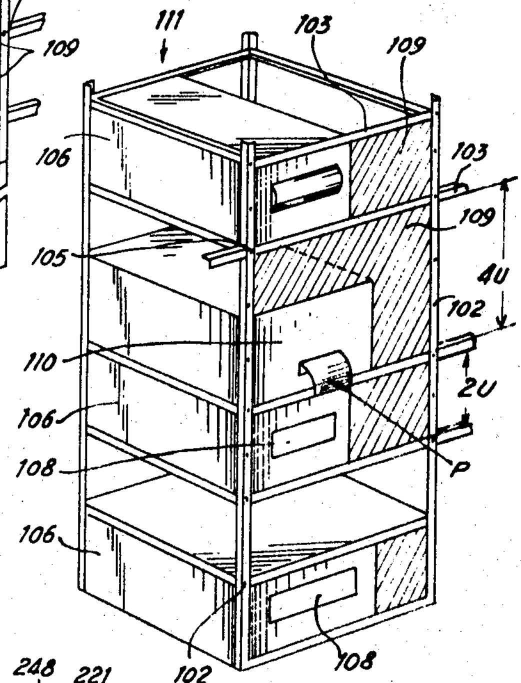
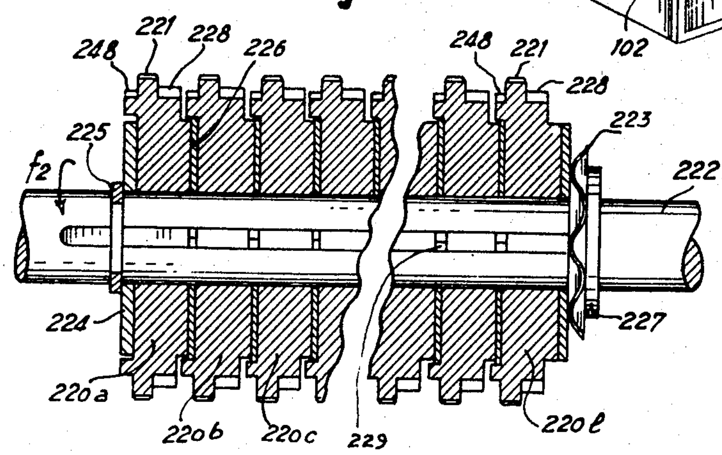


Fig.6



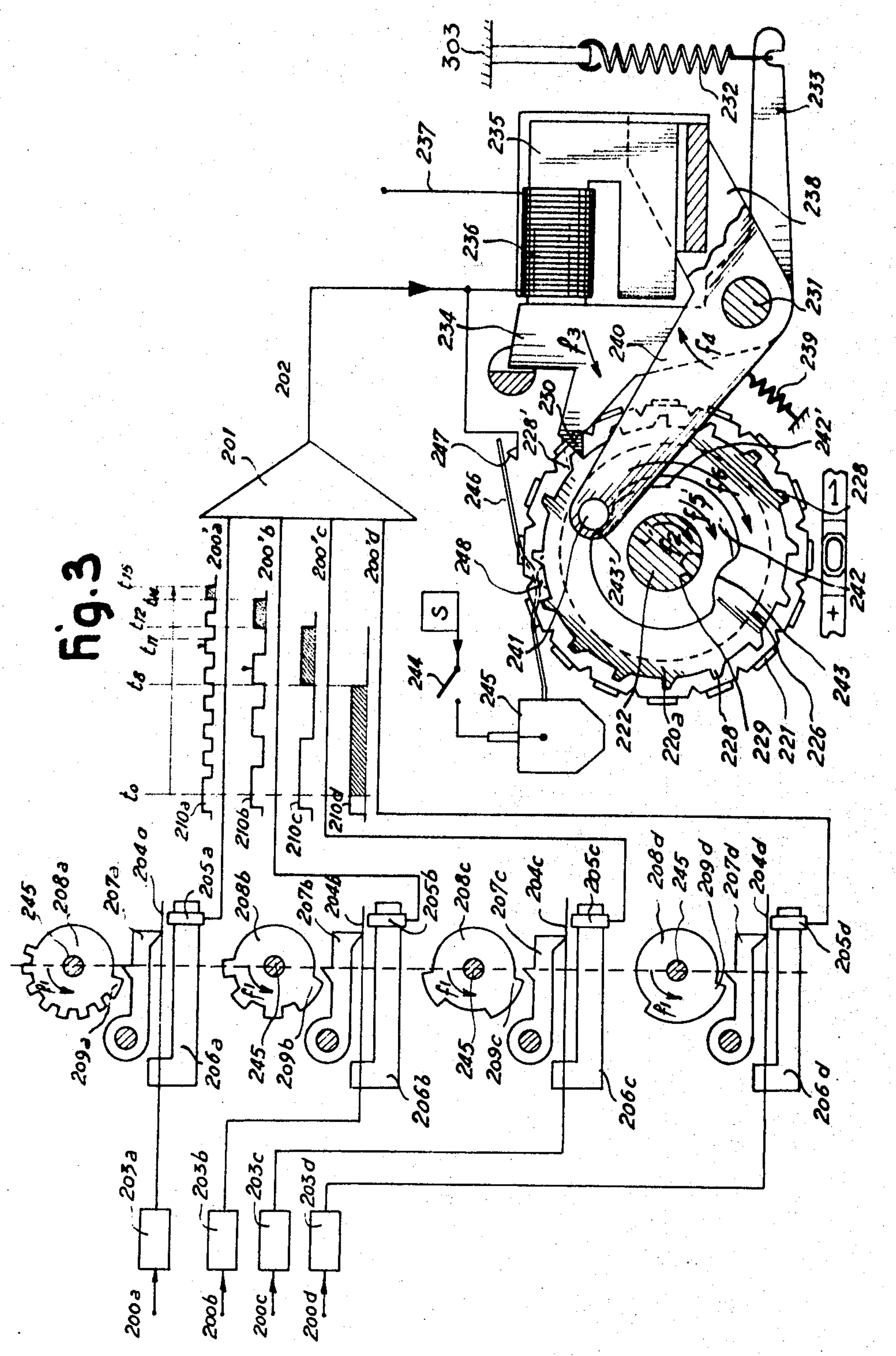


Fig.3

Fig.4

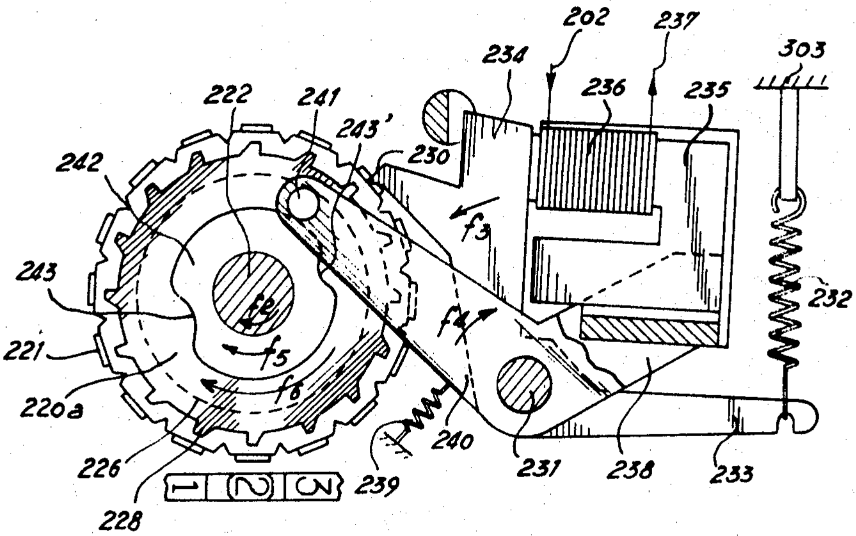
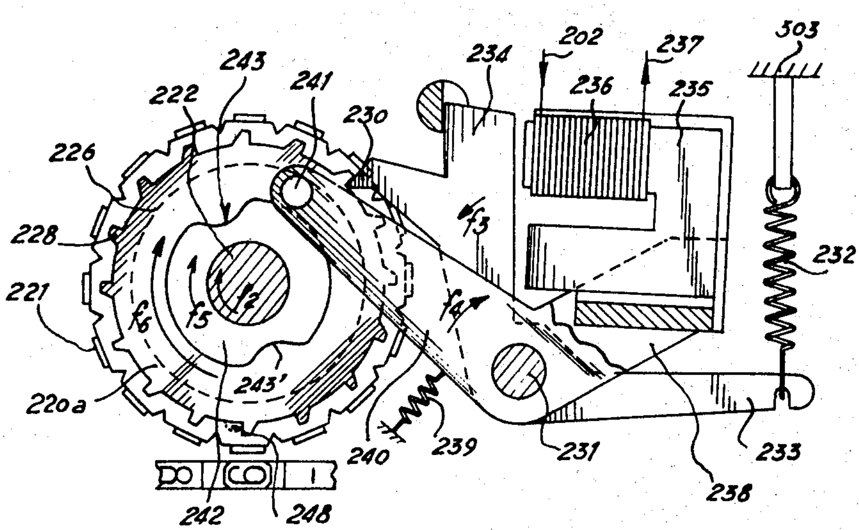

202
237
303
234
236
235
222
241
243'
230
242
243
221
220a
226
228
f3
f4
f2
f5
f6
232
240
239
231
238
233
1
2
3

Fig.5


303
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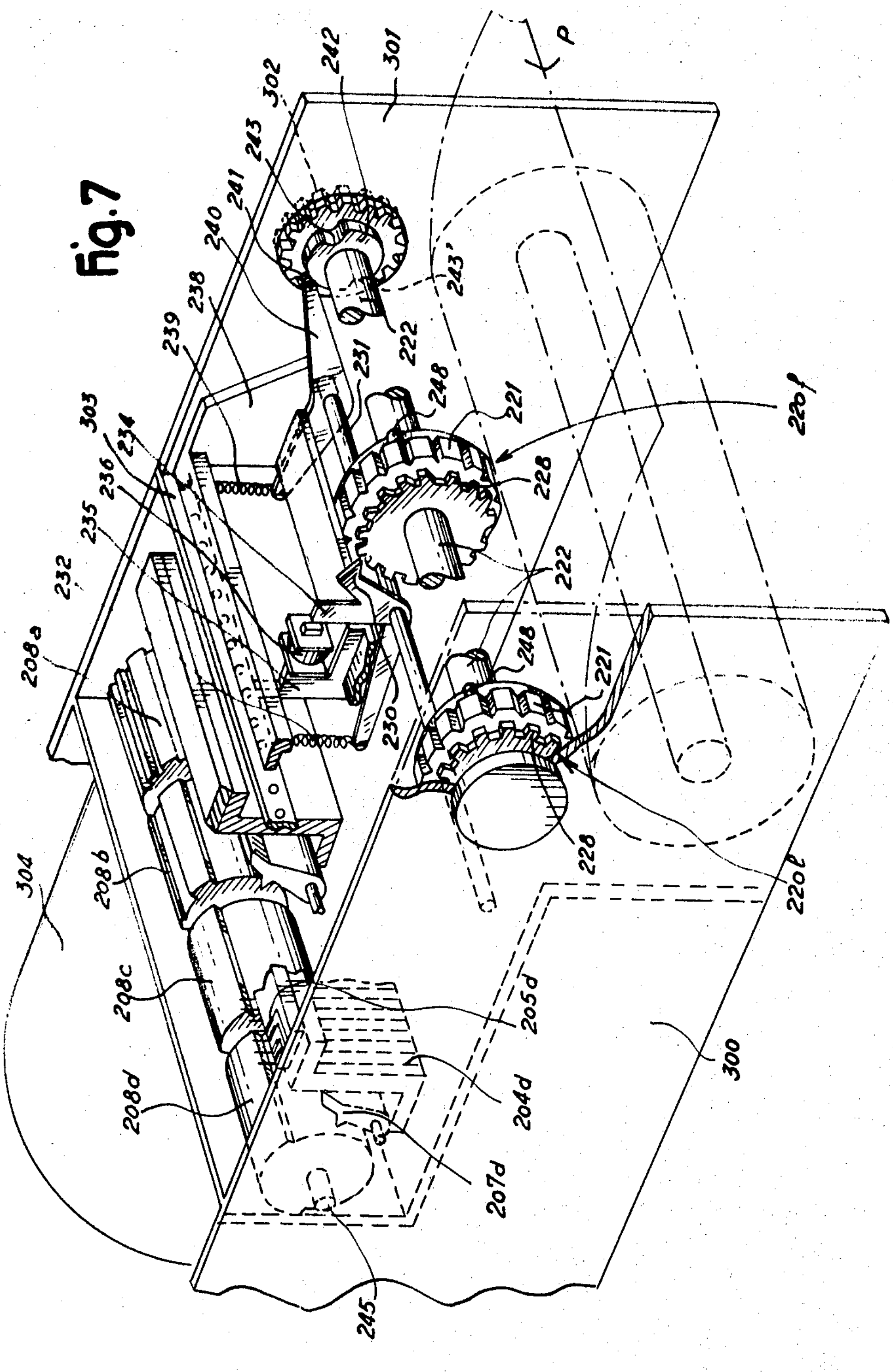
242
248
1

Fig.7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239
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221
220r
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236
228
235
232
222
208a
248
221
230
228
220l
304
208b
208c
205d
204d
300
208d
207d
245

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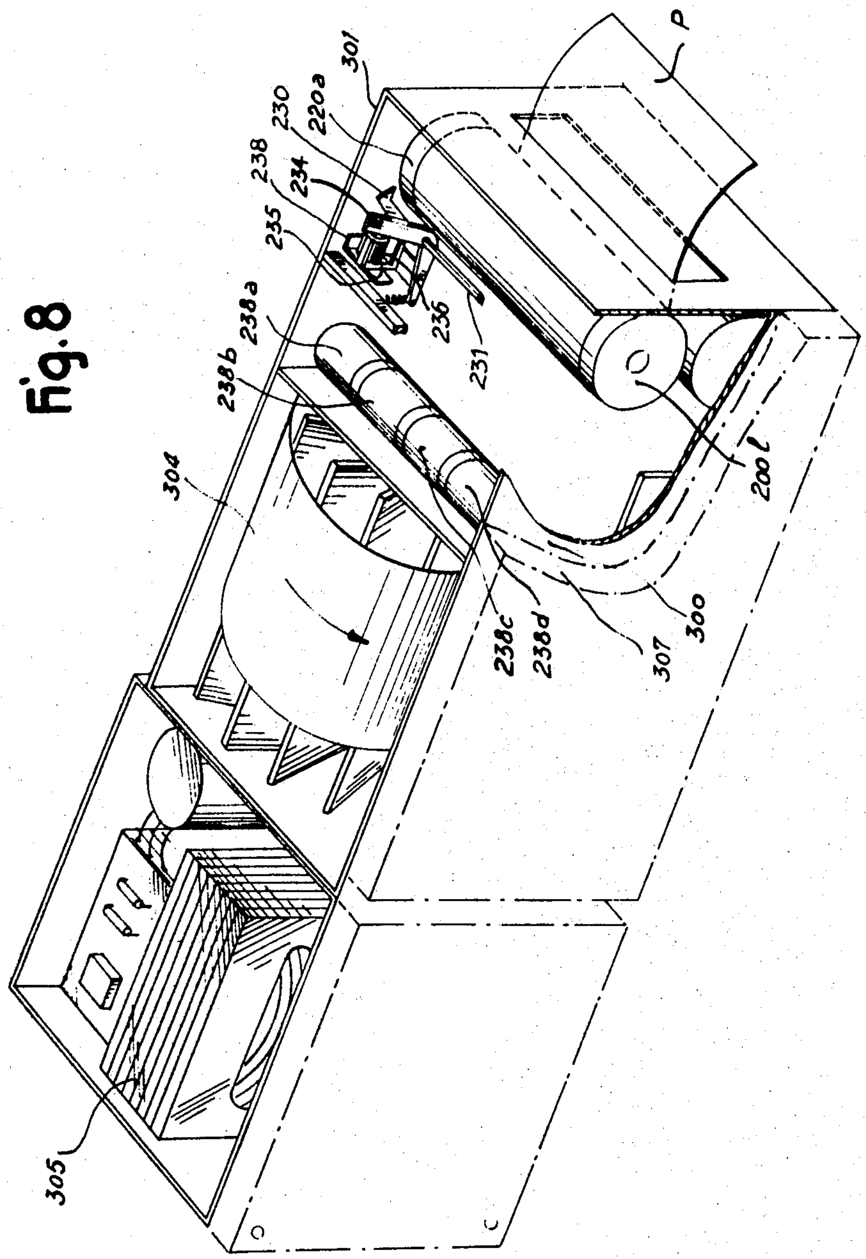
Fig.8



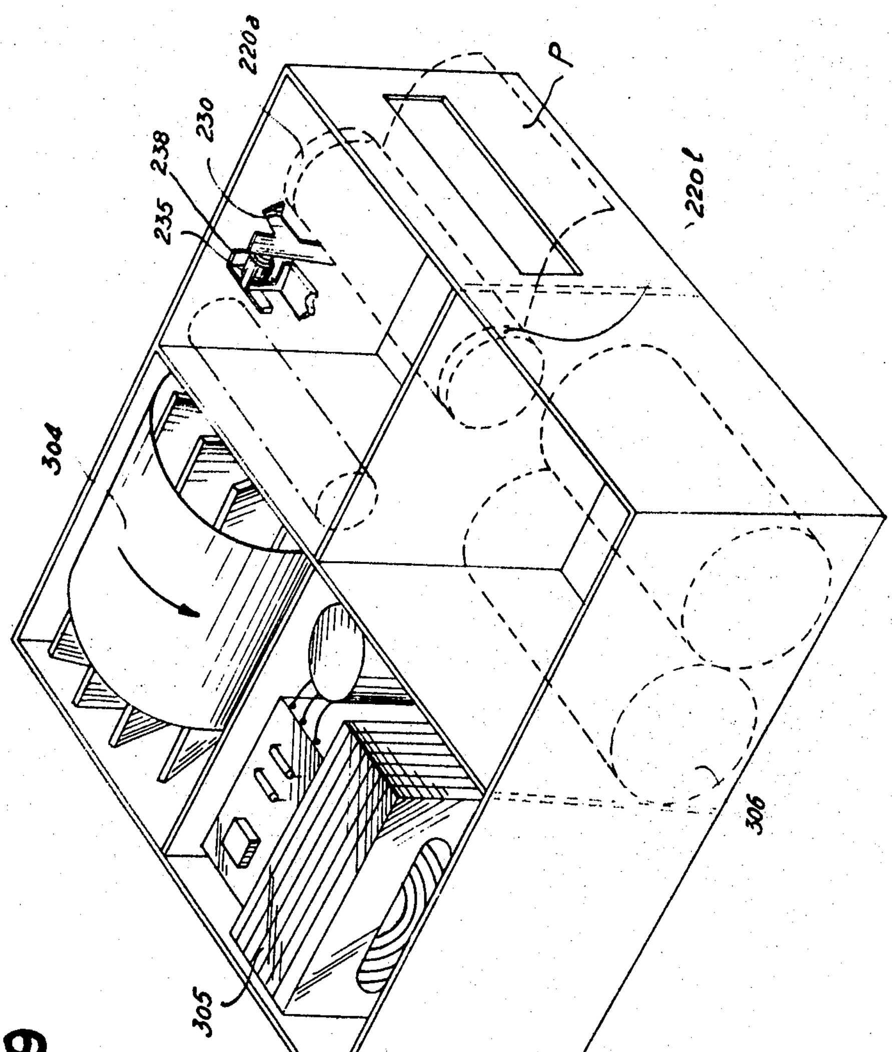


Fig.9

UNIT FOR TRANSLATING AND PRINTING OF DATA SUPPLIED IN A FORM OF COMBINATIONS OF BINARY SIGNALS

CROSS REFERENCE

This application is a continuation in part of copending application Ser. No. 849,044 filed Aug. 11, 1969 now abandoned.

It is known that most traditional office calculating machines have printing units to which data are supplied in the form of combinations of binary signals. These printing units are fed via translation units which deliver a current a variable parameter of which makes it possible to select appropriate characters of a printing member comprising, in addition to the decimal series, certain traditional signs of operations, punctuation, etc. In some types of calculating machines, the translating and printing units are grouped together in the form of a unit which is independent of the machine proper and it is highly desirable for this mixed unit to take up as little space as possible.

A large number of physical measuring apparati used in laboratories provide information in the form of binary signals and the mixed units mentioned above can be used for recording of this information in the form of a succession of values printed on paper tapes. However, when these mixed units must be contained in standardized racks, it is advisable to give them dimensions which are as small as possible so that they will take up only a minimum number of compartments. Nevertheless it is difficult to reduce the size of the electromechanical assembly formed of:

- A battery of character drums mounted on a common shaft.
- Mechanical trains (most of the time formed of gears on rocker arms) to drive the drums in rotation.
- Data conversion, key-train switching, stopping and zeroizing systems, etc. which must be housed respectively in a very narrow section behind each drum.

Because of this difficulty the electromechanical units at present available have excessively bulky structures which result, in the final analysis, in a considerable entangling of the parts and a considerable size.

It has been suggested already to reduce the complex nature and size of these mixed units by replacing the mechanical or electromechanical devices to a greater and greater extent by electronic components; units of this type are then formed of a battery of continuously rotating character drums, the characters of each drum being printed "in flight" (that is to say, upon the passage of the character in front of the paper). However, due to energy which must be supplied to printing hammers controlled by the electronic circuits, it is necessary to provide components, in particular capacitors, in a rather substantial number taking up a rather substantial amount of space. One is restricted, therefore, by a limit below which it is not possible to go without employing special components such as integrated circuits; however, the latter, which must operate under feed voltages which are very narrow, are not at all reconcilable with the questionable, different values of voltages under which the measurement apparati (actually available on the market) supply their data in binary code.

An object of the present invention is to reduce the size and complexity of the mechanical and electromechanical members of the traditional printing units so as to obtain, for the mixed translation and printing units, overall sizes which are much less than those of the mixed units with extensive electronic control.

According to one known decoding technique, the data supplied in the form of combinations of binary signals delivered respectively on different lines of a group of conductors are translated into a pulse the duration of which is representative of the information. The duration of this pulse is then utilized to position the desired character of the printing member. However, up to now, pulses of variable duration were used to feed a motor the pivoting of which (which was larger or smaller depending on the duration of the pulses) positioned the printing member accordingly. Such systems could not be used to attain the object of the present invention because it was necessary to provide one motor for each character drum (in the same manner as one drive train per character drum was previously required), which would have led to truly monstrous structures.

In accordance with this invention, the printing member (for instance a character drum) is clutched (for instance by soft friction) to a drive member (for instance a shaft) which is driven continuously, and means are provided to limit the duration of this clutching to the duration of the pulse translating the information. In this way it is no longer necessary to provide drive means for each drum, it being sufficient rather to provide a locking member which is capable of retaining it after an appropriate stroke. Therefore, a pawl controlled by electromechanical means (for instance very small electromagnets) is sufficient to cause the drum locked in the desired position to slide on the driving shaft. These very small elements may be arranged side by side behind the battery of character drums, and it is easy to accommodate behind them the system enabling the binary signals to be translated into pulses of variable duration.

These basic groups, which are very small, may be accommodated above a paper magazine, the assembly being in turn disposed in front of the driving motor which is generally of rather substantial size but which can be accommodated within the profile of the assembly. In this way the assembly may be housed in a very small parallelepiped space which in any case is much smaller than the size of the translating and printing units known heretofore.

DRAWINGS

The invention will be understood better from the following description and from the accompanying drawings in which a preferred embodiment has been shown solely by way of example.

In these drawings:

FIG. 1 is a diagrammatic perspective view showing a rack of considerable depth equipped with traditional reading and recording units.

FIG. 2 is a diagrammatic perspective view showing a rack of the same type, but of lesser depth.

FIG. 3 is a basic diagram of a mixed translating and printing unit according to the invention in which the essential mechanical structures are included.

FIGS. 4 and 5 show the mechanical printing members of FIG. 3 in two particular operating positions.

FIG. 6 is a longitudinal section through the battery of character drums of the unit of FIG. 3.

FIG. 7 is a perspective view showing how the mixed translating and printing unit of FIG. 3 is arranged within a parallelepiped chassis.

FIG. **8** is an overall diagrammatic perspective view of the complete mixed translating and printing unit of FIG. **3**, that is to say, equipped with its power supply unit, these elements being so arranged as to enable the entire assembly to be placed in the rack of FIG. **1**.

FIG. **9** is a view similar to that of FIG. **8**, showing the mixed unit and its power supply unit disposed so as to permit introduction of the assembly into a rack of the type shown in FIG. **2**.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

There should first of all be recalled in support of FIGS. **1** and **2** the conditions under which the translating and printing units used with measuring units are accommodated in standard racks. Racks **101** and **111** (FIGS. **1** and **2**) consist, according to standards which are at present general, of vertical uprights **102** joined by front and end horizontal cross bars **103** and **104** respectively which subdivide each column into a series of superposed parallelepiped spaces. The dimensions of these spaces are standardized:

On the one hand in height by the spacing between the cross bar attachments (in general holes **105**) which are distributed uniformly along the uprights **102** (this spacing being universally 44 millimeters).

On the other hand in width by the frontal distance between two uprights, which is 19 inches (about 480 millimeters).

And finally in depth.

It is clear that these spaces may serve to accommodate units **106** which can be introduced like drawers between the cross bars and then fixed to the latter by front plates. As a result of this, a certain tolerance can be permitted with respect to depth, and in any event the ends of the drawers have to be used for passage of connections **107**; in practice, the depths of the units vary by around two semi-standard dimensions, one of the order of 350 millimeters and the other in the order of 250 millimeters.

Naturally, the outline, that is to say, the external dimensions of these units, must be slightly smaller than the above dimensions in order to take into account the widths of the cross bars **103, 104** and of the uprights **102** which are generally made of simple perforated angle pieces. As a matter of fact, the standard height unit of 44 millimeters is small and the reading, monitoring or recording units accommodated in these racks generally occupy at least two superposed compartments, that is to say, the space taken up by them in height is at least slightly less than 88 millimeters, or "2U" if the standard unit of 44 millimeters of height is designated by U.

The double degree of adjustment of the dimensions of the units (option as to depth and choice of a height equal to 2U, 3U, 4U, etc.) offers manufacturers options in presenting measuring instruments (voltmeter, ammeter, frequency meter, etc.) capable of being accommodated in these racks; in general, these instruments do not fill the entire widths of the compartments but often occupy half or three-quarters thereof. The users demand in practice that the instruments be as compact as possible in order to increase the number of monitoring units on a rack of given frontal area. On the other hand, it is essential that the elements and windows **108** intended for direct reading be of a reasonable minimum size. Consequently, most of the compartments are incompletely filled, and the rack with its equipment assumes the aspect of a cupboard comprising irregularly distributed empty cells which have to be blanked off by sheets of metal **109** of varying outlines.

The final result, which is contrary to the basic objective, is appreciable waste of available space and observation areas. This drawback is particularly marked when measuring units **106** have to be coupled to recording units **110** which print on a paper tape p the data posted on the windows of the direct reading units. The manufacturers of such printing units seek to make them smaller for the same reasons. However, it is very difficult to go below a certain limit dictated by the size of the main constituent elements.

Consequently, a measuring assembly with both direct and recorded reading is distributed, for example, and in the best case (FIG. **2**):

In a compartment having a height of 2U, the width of which is incompletely filled, for the direct reading part.

In another compartment of a height of at least 3U (actually 4U in order to preserve the alignment of the cross bars **103** of the adjacent columns) and filled to a greater or lesser extent in height as a function of miniaturization of the recording apparatus.

Such an assembly therefore takes up a width of one rack, over a height of five or six compartments, of 44 millimeters each, and the closing of said incompletely filled compartments must be accomplished by various sheets of metal **109**.

There will now be described an extremely small mixed translating and printing unit which, in the embodiment shown in FIG. **8**, can be accommodated in a quarter compartment of a rack illustrated in FIG. **1** and which, in the embodiment thereof shown in FIG. **9**, can be accommodated in a half compartment of a rack illustrated in FIG. **2**. In order to facilitate the description of this mixed unit, the diagrammatic structure of the translating unit and of the printing unit will first be explained, and then the operation of these two units will be explained. Thereupon it will be indicated how these units may actually be arranged within a chassis.

The translating unit is illustrated on the lefthand side of FIG. **3**. In the example shown, the transmission of the information coming from the measuring unit and to be printed on a paper tape p (FIGS. **7** and **9**), by means of a character drum which will be described subsequently, is effected by a so called "four-moment binary" system, that is to say, the control circuit of each printing drum is fed by a group of four lines **200***a*, **200***b*, **200***c*, **200***d*. Each of these lines receives information in binary code and may exhibit either absence of current (low level) or presence of current (high level), so that by working between the current levels of these four lines one can obtain 15 specific kinds of combinations, that is to say, 15 different items of information, not counting zero. These items of information are translated by a known system which will now be described and the object of which is to translate the fifteen combinations in question by a series of 15 pulses distinguished by the fact that their durations vary in arithmetical progression. According to this system the signals received on each line **200***a* to **200***d* are split up, starting from the same time origin t_0 (FIG. **3**), in such a manner that these signals are subdivided into pulse trains the respective durations of which are equal to the intervals. However, since the lines are arranged conventionally in a predetermined order, the durations of the split-up pulses on each line increase geometrically in accordance with a ratio of 2 from one line to another. In the case of FIG. **3** if it is assumed that the four lines **200***a* to **200***d* are fed simultaneously with current (that is to say, receive a binary positive signal), one will try to obtain pulse trains in the form of square waves, the relative duration of these pulses being 1 for the line **200'***a*, 2 for the line **200'***b*, 4 for the line **200'***c* and 8 for the line **200'***d*. Naturally absence of current on any one of the lines will eliminate any pulse train on the line in question. Also the pulse trains coming from the four lines are regrouped and amplified in an amplifier **201**. These pulses then supplement one another successively in decreasing order of their durations, the combining of which can be appreciated by considering the pulses in the inverse order of the lines, that is to say, starting with line **200***d*. If the latter is fed with current, a pulse duration equal to 8 is obtained (hatched square wave disappearing at t_8). If the line **200***c* is likewise fed, the hatched square wave on the line **200'***c* which fades away at t_{12} supplements the preceding square wave, so that only a single pulse having a duration equal to $8 + 4 = 12$ is observed on the collector line **202**. One can continue step by step in such a manner that a pulse of duration t_{15} may be observed if the four lines are fed. If only the lines **200***d*, **200***b* and **200***a* are fed, a pulse will be observed which, starting from the instant t_0, will last until the instant t_{11} by joining of the hatched pulse on line **200'***d* and the two pulses marked with an arrow on lines **200'***b* and **200'***a*. A detailed description of the device making it possible to obtain this combining of several pulses will not be given since it is a conventional device. It will merely be indicated that the four lines **200***a* to **200***d* are equipped with nonreturn devices **203***a* to **203***d* and that each of the lines is terminated by an oscillating blade **204***a* to **204***d* capable of being brought to bear against conductive studs **205***a* to **205***d* mounted on insulating armatures **206***a* to **206***d*. Rocking fingers **207***a* to **207***d* make these alternate contacts under the control of toothed wheels **208***a* to **208***d*. Of course, wheel **208***d* has one tooth, wheel **208***c* has two teeth, wheel **208***b* has four teeth, and wheel **208***a* has eight teeth. All these wheels are mounted on the same shaft, and it will be noted that the initial teeth of each of the wheels are slightly extended in the leading direction at **209***a* to **209***d* so as to produce pulses **210***a* to **210***d*, to which reference will be had hereinbelow. It will also be noted that the eight teeth on wheel **208***a*, the four teeth on wheel **208***b*, the two teeth on wheel **208***c* and the tooth on wheel **208***d* are arranged within a half circumference, which point will be reverted to later on.

It is clear that when the four wheels **208***a* to **208***d* keyed to the same shaft are caused to rotate simultaneously in the direction of arrows *f***1**, signals received at **200***a* to **200***d* are split up in the form of pulse trains illustrated on each of the lines **200'***a* to **200'***d*. It will be seen therefore, that with the above device it is possible for a pulse whose duration may be between 0 and 15 (that is to say, in fact, **16** specific kinds of durations) to be picked up by collector **202**. This pulse results from joining the unit "initial" pulses, that is to say that it occurs starting from the reference instant t_0 which corresponds, subject to fractions of teeth **209***a* to **209***d*, to the instant when the teeth act on fingers **207***a* to **207***d*. It will be noted also that the longest joined initial pulse (of a duration of 15) is followed by an absence of current for at least an equal period of time due to the absence of any tooth on the half of the circumference of the wheels **208***a* to **208***d*. In order more precisely to determine frequency and distribution of the initial joined pulse upon each cycle of rotation of wheels **208***a* to **208***d*, two revolutions per second may be adopted as the speed of rotation of said wheels; moreover, this cycle of rotation will be subdivided (by convention based on the divisions of circumference which are easily obtainable on gear cutting machines) into 39 equal parts. Under these conditions, tooth elements **209***a* to **209***d* (which determine the simultaneous pulses **210***a* to **210***d*) correspond to 2/39 of a cycle. The remaining teeth on wheel **208***d* correspond to 8/39 of a cycle, while the remaining teeth on wheel **205**a extend over 15/39 of a cycle. This means that on the four wheels **208**a to **208**d there remain 22/39 of a cycle during which no current flows to collector **202**. In short, in the course of a complete cycle:

- 2/39 of a cycle are, as will be seen later, reserved for preparing for the exploitation of the initial joined pulse.
- 15/39 of a cycle are used for the purpose of transmitting said initial joined pulse which is intended to position the printing member.
- 22/39 of a cycle are used for the operations of printing and resetting to zero.

The printing unit will now be described with reference to the lower right part of FIG. **3** and to FIGS. **4**, **5** and **6**. This unit consists essentially of a battery of 12 drums **220***a* to **220***l* (FIG. **6**) the edge of which carries 16 characters **221** comprising the signs 0 to 9 and other conventional symbols (such as + and − signs, punctuation marks, etc.). These drums are mounted idly on shaft **222** and are pushed as a battery by annular spring **223** against washer **224** which is held in position by clip **225**. Between each pair of adjacent drums there are arranged friction disks **226** keyed to shaft **222** so that under the pressure of spring **223** (which is locked by another clip **227**) all the drums of the battery are driven by soft friction upon the rotation of shaft **222**. These drums may be locked nevertheless by means of peripheral notches **228** which can be seen both in FIG. **6** and in FIGS. **3**, **4** and **5**. Wheel **220***a* with characters **221** moreover can be noted in FIGS. **3**, **4** and **5**. For clarity in explanation, the line of characters (as seen from below) has been shown below each wheel.

Friction driving disks **226** keyed at **229** to drive shaft **222** which is driven in the direction indicated by arrow *f***2** can also be noted. Character drum **220***a* which is thus driven can be stopped by pawl **230** rocking on shaft **231** and urged in the direction indicated by arrow *f***3** by spring **232** attached to lever arm **233**. This pawl has ferromagnetic tip **234** which is capable of cooperating with core **235** of electromagnet **236** fed by collector line **202** and having outlet line **237** serving as return for lines **200***a* to **200***d*.

The electromagnet and its core are mounted on cradle **238** which also rocks on shaft **231** and is also urged in the direction indicated by arrow *f***3** by spring **239** attached to arm **240** provided at its end with transverse finger **241**. This transverse finger is capable of cooperating with cam **242** which is driven in the direction indicated by arrow *f***5** at a speed of rotation identical to that of wheels **208***a* to **208***d*. In the position illustrated in

FIG. **3**, when finger **241** is engaged in one of two depressions **243** and **243'** provided on both sides of cam **242**, pawl **230** is engaged in notch **228** and core **235** is applied against ferromagnetic armature **234**.

The operation of the printing unit is as follows. In the position shown in FIG. **3**, the printing unit is at the instant which precedes by 2/39 of a cycle, the instant t_0 at which the initial joined pulse is fed into collector **202**. In this position, character wheel **220***a* presents character "0" for printing (see in this connection the characters illustrated below the wheel).

During these 2/39 of a cycle on the one hand, tooth elements **209***a* to **209***d* close contacts **204***a*, **205***a* to **204***d*, **205***d*. During these 2/39 of a cycle pulses **210***a* to **210***d* pass into conductors **200'***a* to **200'***d* to the extent that conductors **200***a* to **200***d* are receiving current. The winding of the electromagnet is calculated in such a manner that it is sufficient for only one of these four pulses to pass into one of the conductors **200'***a* to **200'***d* in order for armature **234** to be held against core **235**. Consequently, if only one of the conductors **200***a* to **200***d* is fed, there will be a pulse of a duration of between 1 and 15 in collector **202**. In the case in which no signal appears on the lines **200***a* to **200***d*, there is no current in collector **202**.

On the other hand, cam **242** pivots 2/39 of a revolution and causes finger **241** to emerge from upper depression **243'**. Consequently, if a current flows in collector **202**, pawl **230** accompanies withdrawal of cradle **238** in the direction indicated by the arrow *f***4** (see FIG. **4**). If no current flows in collector **202**, pawl **230** remains in place, while cradle **238** withdraws (position illustrated in FIG. **5** with respect to these two parts). In the first of these two cases, wheel **220***a* starts to rotate in the direction indicated by arrow *f***6** at a speed which (for reasons which will be explained further on) is at least more than substantially twice the speed of cam **242**. This means that shaft **222** is driven by a train of gears which causes it to rotate considerably more quickly than cam **242**.

As long as the initial joined pulse is circulating in collector **202**, armature **234** remains held against core **235** (FIG. **4**). On the other hand, as soon as the initial joined pulse ceases, the electromagnet ceases to be fed and pawl **230** is urged by spring **232** in the direction indicated by arrow *f***3** (FIG. **5**). It therefore engages in notch **228** whose position is a function of the amplitude of pivoting of wheel **220***a*, that is to say, of the duration of the pulse circulating in collector **202**.

For example, in the case of FIG. **5**, character wheel **220***a* has carried out 9/16 of a revolution and the lower character ready for printing is number 9. As soon as pawl **230** has dropped into notch **228**, character wheel **220***a* is locked, while shaft **222** continues to rotate, in the same manner as cam **242**, until the time when finger **241** starts to penetrate into depression **243**. 20/39 of a cycle have then elapsed from the moment when the initial joined pulse was started. These 20/39 of a cycle have been broken down into:

15/39 for the transmitting and exploitation of the initial joined pulse, and

5/39 alloted to printing by conventional means and to the refeeding of electromagnet **236** by an auxiliary circuit shown in FIG. **3**.

As a matter of fact, a feed terminal S makes it possible to feed the electromagnet up to return line **237** via contact **244**, terminal **245**, flexible conductor **246** bearing against a circular ramp provided on the drum alongside the characters, and by contact **247** which is opened at the same time as contact **244** when stud **248** on the ramp of the drum lifts flexible blade **246**. Therefore, in the course of the 5/39 of a cycle mentioned above, source S is fed, contact **244** is closed, and stud **248** is well below shaft **222** (FIG. **5**).

At the moment when the finger **241** starts to penetrate into depression **243**:

tape *p* of printed paper is advanced by one line to present a blank surface for printing,

cradle **238** starts to rock forward,

and the electromagnet is fed by circuit S.

Finger **241** remains in depression **243** for 2/39 of a cycle and then rises again on cam **242**. Cradle **238** accompanied by pawl **230**, then withdraw in such a manner that character wheel **220***a* starts turning again at the speed of shaft **222** until the moment when stud **248** opens circuit S which feeds the electromagnet. At this moment pawl **230** drops again (FIG. **3**), while the character wheel presents character "0" at its lower part and while shaft **222** and cam **242** continue to rotate until finger **241** is again engaged in depression **243'** (FIG. **3**).

Between the time when finger **241** leaves depression **243** and said finger penetrates into depression **243'**, 15/39 of a cycle have elapsed and have been used in order to return the character wheel to its initial position, the latter having rotated for a longer or shorter time depending on the character on which it had previously been stopped for printing purposes.

Under these conditions, it will be realized that shaft **222** must carry out 15/16 of a revolution during a complete cycle (there is, in fact, no use in moving the character wheel if it is to be returned to the same character);

a first time during the 15/39 of a cycle reserved for the exploitation of the initial joined pulse,

and a second time during the 15/39 of a cycle reserved for resetting to zero.

This means that shaft **222** must rotate in a ratio of 39/16 with respect to the speed of rotation wheels **208***a* and **208***d* and of cam **242**. This makes it possible to limit the speed of rotation and accordingly the wear on wheels **208***a* to **208***d*, while only the character wheels rotate at a higher speed.

Referring to FIG. **7**, it will be seen that the battery of character wheels may be accommodated at the upper front part of a chassis formed of two sides **300** and **301**. Cam **242** mounted on shaft **222** may be driven by individual toothed ring **302**, while shaft **222** itself is driven by another pinion situated behind toothed ring **302**, and therefore not shown in the drawing.

Thin electromagnets **235** and pawls **230** can be accommodated easily behind each of the character wheels, while return spring **239** of the cradle and return springs **232** of the pawls can be hooked into transverse bar **303** engaged in notches in sides **300** and **301**.

Finally, wheels **208***a* to **208***d* may be arranged behind the electromagnets, and it is sufficient, for example, to have all conductors **200***a* relating to the 12 character drums pass below wheel **208***a* whose width is increased accordingly. This is a simple arrangement of connections in parallel which makes it possible to obtain a more compact assembly than if the trains of four wheels were repeated in series behind each drum. Finally, the batteries of drums and electromagnets (FIGS.

7 and 8) can be arranged above the paper-feed magazine, while motor **304** can be accommodated immediately behind wheels **208***a* to **208***d*.

A speed-reduction transmission device (not shown) may be accommodated below the battery of wheels **208***a* to **208***d* in order to control a train of gears which is housed behind side **301** and drives shaft **245** of wheels **208***a* to **208***d*, toothed ring **302** and (at a speed in the ratio of 39/16) shaft **222.** In this way there is obtained (FIG. **8**) a very narrow translating and printing assembly which may be provided at its rear part, with a conventional power supply unit comprising transformer **305,** which assembly may be recessed in a quarter rack as shown in FIG. **1.** The power supply unit **305** may even be arranged (FIG. **9**) on the side of motor **304** and paper storage compartment **306** may then be provided alongside the translating and printing mechanisms. The usual electronics for this type of translating and printing unit may advantageously be grouped on a board (see FIG. **8**) which, because of the very small dimensions of the simple components which are to be provided, is fixed at **307** against the external face of side **300.**

The invention is, of course, not limited to the embodiment which has been described and illustrated. It is clear that although character drums are customarily employed, linear printing members could be used, provided that these members could be clutched to a constantly actuated driving member. Likewise, pawl **230** served to lock character wheel **220**a for resetting to zero, but this locking could be effected via a separate stop member, provided that this member could be retracted at the start of the initial joined pulse. Likewise, the zero resetting mechanism described and illustrated in which stud **248** opens electric circuit S could be replaced by a simplified arrangement. For example, it may be imagined;

- that notch **228** against which pawl **230** strikes when the zero is in printing position (FIG. 3) comprises by way of exception an extension **228'**, illustrated in broken line, and
- that the part of cam **242** on which finger **241** slides during the zero-resetting phase is of slightly smaller radius (**242'** in FIG. 3) than the opposing part of the cam, so that pawl **230** is not so far away from the character wheel in the course of the zero-resetting phase as in the course of the phase of using of the initial pulse.

It is thus sufficiently simple to maintain the feeding of electromagnet **236** for protruding notch **228'** to strike against pawl **230** during the zero-resetting rotation. Of course, notch **228'** does not interfere during the phase of using the initial joined pulse in which the cradle and therefore the pawl would be further withdrawn by the action of the ramp diametrically opposite to cam **242'**.

I claim:

1. In a unit for translating and printing data supplied as combinations of binary signals respectively delivered on different lines of a group of conductors, with said signals being split up on each of the lines into trains of pulses which start simultaneously and have pulse durations equal to intervals therebetween, wherein said pulse durations double from each of the lines to the next in a geometric progression; an improvement comprising printing means having a plurality of printing characters, a signal source for generating said binary signals and connected to said group of conductors, collector means having said group of conductors coupled thereto for combining said pulses into a joined pulse and having an output lead for conducting said joined pulse, a rotatable drive shaft, clutching means connected to said collector means output lead for clutching said printing means to said rotatable drive shaft to move said printing means to position said characters successively in juxtaposition with an article to be printed, means for starting the printing means from a reference position and for moving said printing means a number of characters proportional with the duration of the joined pulse on the collector output lead, and means for releasing said printing means from said rotatable drive shaft at termination of said joined pulse to permit printing by one of said printing characters.

2. The invention as set forth in claim **1,** wherein said printing means comprises a drum mounted on said shaft and having light friction therewith, and wherein said clutching means comprises locking means for preventing the drum from rotating with the shaft at the termination of the joined pulse.

3. The invention as set forth in claim **2,** wherein said locking means comprises a spring and a locking member urged by said spring towards said printing drum, and an electromagnet connected to said collector means output lead for electrical energization of said collector means output lead, said electromagnet disposed for engagement with said locking member to hold said locking member away from said drum against the force of said spring until termination of said joined pulse, said electromagnet arranged to free said locking member for movement toward said drum to prevent rotation thereof after said termination.

4. The invention as set forth in claim **1,** including a plurality of said clutching means, a plurality of said groups of conductors, and a plurality of said printing mean mounted on said rotatable drive shaft and each of said printing means individually controlled by one of said groups of conductors.

5. The invention as set forth in claim **4,** wherein each said printing means comprises a printing drum frictionally mounted on said shaft, and further comprises a chassis having longitudinal side walls, a compartment for feeding paper for printing purposes disposed transversely between the two sides of said chassis, and a motor for driving the drive shaft and disposed between the side walls, said printing drums being disposed within said chassis walls between said motor and said compartment.

6. The invention as set forth in claim **5,** in which said source of binary signals is arranged between the two sides and between the drums and the driving motor.

7. The invention as set forth in claim **1,** wherein said source of binary signals comprises a battery of contacts and a battery of cams for actuating said contacts, said cams being equal in number to the lines of one of said groups of conductors, and said contacts being respectively connected to said conductors, wherein the contacts for the signals to be split are actuated simultaneously in parallel by one of said cams.

8. The invention as set forth in claim **2,** further comprising means for releasing said locking means to enable the drum to be driven to said reference position, abutment means for stopping said drum at its reference position, and retracting means for retracting said abutment means at the beginning of a subsequent cycle.

9. The invention as set forth in claim 8, wherein said abutment means is included in said locking means.

10. The invention as set forth in claim 9, wherein said means for releasing said locking means after printing and at the beginning of the joined pulse comprises a ferro-magnetic armature on said locking means, a cradle mounted within said device for movement toward said locking means, an electromagnet mounted on said cradle, and wherein said electromagnet is energized as it moves toward said locking means so as to attract and take with it said locking means by magnetic connection to said ferro-magnetic armature when said cradle withdraws.

11. The invention as set forth in claim 10, further comprising means to operate said cradle and electromagnet at the beginning of the cycle so as to release said locking means once said drum has been stopped in its reference position.

12. The invention as set forth in claim 11, further comprising means for effecting the operations of attracting said locking means and withdrawing said cradle at the same time as the joined pulses are started and then for effecting said operations again after at least one revolution of said drive shaft taking longer than the duration of the longest joined pulse and at the beginning of a phase extending at least over one revolution of the drive shaft and while the retractable abutment means is set in action.

13. The invention as set forth in claim 1, further comprising a cam rotatable with said drive shaft at a speed at least substantially half that of said drive shaft, wherein said cradle is caused to move by means of said cam.

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