D R A F T

Invention of an Electronic Translator or Combiner for Printing Telegraphy and Other Purposes

In order to explain the invention, a few extracts will be quoted from Harrison's "Printing Telegraph Systems and Mechanisms"

Page 218:

> The mechanical basis of many translators rests on the use of a comparatively small number of differentially slotted permutation bars, the varying arrangements of which allow at any one time one of a larger number of cross bars to move in a manner that subsequently determines the printing of the desired letter.
>
> The operation is the inverse to that effected in the case of the composing keyboard. There any one of a large number of keys operates on a small number of differentially notched bars to arrange them in various ways to determine one of a number of letter signals.
>
> Fig. 217 represents five differentially slotted bars in their normal position. If they are shifted singly, or in combination, to the right an aligned slot will be presented to one of thirty-one cross bars CB, which rest on their top faces. The figures opposite the top bar indicate which bars have to be shifted, in order that the cross bar may be selected.
>
> Obviously the bars may become discs with the cross bars surrounding them, the discs having to be independently moved through a small angle.

Page 221:

> Baudot has devised many all-electric methods based on a principle which Fig. 220 will serve to explain. Two groups of levers, 1-5 and 1'-5', have resting and operating contacts connected each to each, but the connections of the levers of one group are seen to be the inverse of the other group.

In series with lever 1 of one group and 5' of the other group is a battery B and printing magnet PM. If group 1-5 is set by line signals to any permutation, and levers 1'-5' are mechanically caused to successively form the thirty-one permutations, the circuit will be closed when they make the permutation corresponding to the setting of the levers 1-5.

A translator based on this principle is shown in Fig. 221. Five discs are differentially notched and mounted on a continuously rotating shaft carrying a type wheel. Five bell cranks or "seeker levers" are pivoted to the frame, and by means of rollers rest on the edges of the discs. The upper ends of the levers have contacts as shown. As the discs D_1-D_5 rotate the levers "seek" for the combination which is stored in a set of relay armatures, and the printing magnet circuit will be closed as explained in connection with Fig. 220.

There are many ways in which the discs may be arranged with respect to each other, but the particular arrangement of Fig. 222, sketch A, was the one chosen on account of a peculiar property which is worth noting. If we stagger the discs with respect to one another and re-arrange the seeker levers, as in sketch B, the result will be the same, i.e. the same letter will be printed for any setting of the relays with either A or B. But B can clearly be reduced to the single disc of C, and we arrive at the modification of Fig. 223, which requires no explanation. The methods of Figs. 221-223 can be modified, in that commutator discs may take the place of the notched discs, and a rotary contact brush form the five seeker levers. Fig. 224 explains this. Here five pairs of commutator discs have spacing and marking segments in accordance with the series 2, 4, 8, 16, 32, half of the segments in each pair being marking, and the other half spacing. For any setting of relay armatures R_1-R_5, a point will be found on the commutators at which the circuit to the printing magnet will be closed. Baudot called this apparatus a <u>combiner</u>, since it combines any of the thirty-one letter signals into the single printing impulse. This arrangement of Baudot's is in use to-day on the Siemens and Halske high-speed automatic system.

My invention consists in employing a cathode tube in which the stream of electrons is focused into a beam and the beam acted upon by properly positioned deflecting plates on which alternating current is impressed from an oscillator thus causing the beam to be set into rotation. The speed of rotation, the circumference described by the beam as it hits the anode, etc. are determined by factors controlled by the position of the deflecting plates and the ~~impressed~~ voltages and frequencies impressed thereon.

The anode takes the form of a segmented disc in which the segments are insulated from one another and each segment is then connected to a contact point outside the tube. In the construction in mind there would be 32 such segments. In front of this segmented anode is a series of plates of non-conducting material, circular in form. There are 5 such plates in concentric arrangement. Fig. shows one such ~~a~~ plate. Each plate is made of non-conducting material and contains 32 pairs of holes which are occupied by circular grids. ~~and~~ The grids are ~~insulated from the plate. The segments are~~ all connected to conductors ~~a source of positive current~~ outside the tube, the arrangement being such that potential can be applied alternately to the members of each pair of grids.

The 5 plates similar to the one described above correspond to the 5 slotted permutation bars of the Baudot translator. When potential is applied to these 5 plates in combinations corresponding to the Baudot code and the electronic beam is set into rotation there will be one and only one alignment of grids which will permit the beam to hit a segment on the ~~cathode~~ anode behind the 5 plates. Since the beam can be set into rotation at varying speeds from very low to very high speeds, it is clear that this electronic translator, having no inertia, can operate at corresponding speeds.