Jan. 22, 1963 B. J. WARMAN ETAL 3,075,184

FERRITE CORE MATRIX TYPE STORE ARRANGEMENTS

Filed Nov. 27, 1959

2 Sheets-Sheet 1

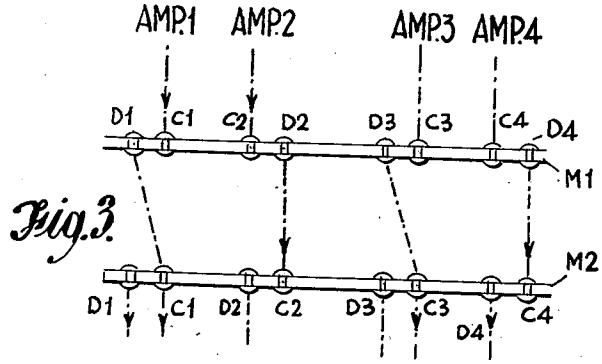


Fig. 3.

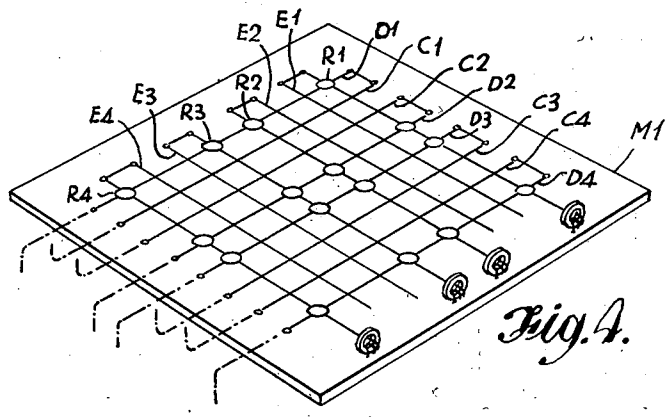


Fig. 4.

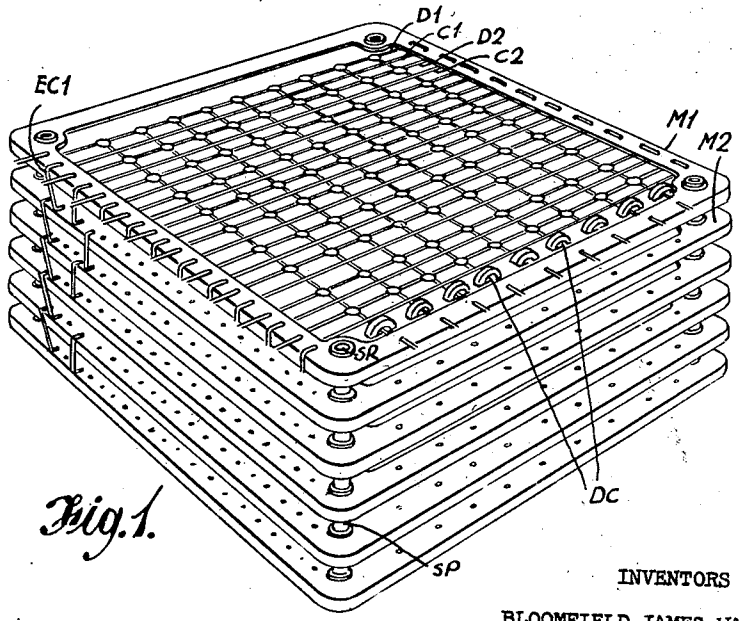


Fig. 1.

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2 Sheets-Sheet 2

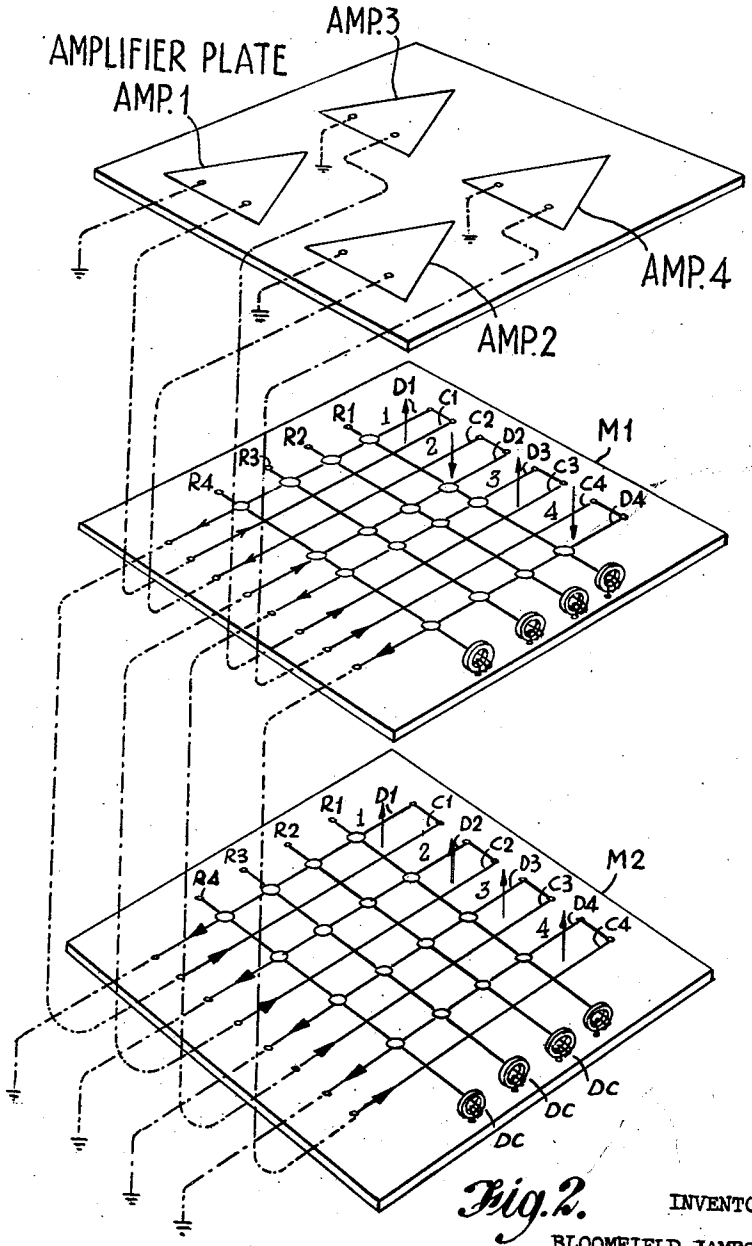


Fig. 2.

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FERRITE CORE MATRIX TYPE STORE ARRANGEMENTS

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3 Claims. (Cl. 340—174)

This invention relates to ferrite core matrix type store arrangements of the kind in which a number of matrices are stacked one over the other.

The invention is especially concerned with arrangements in which a common conductor is associated with the cores of all the columns or rows as the case may be in a vertical plane, i.e. with a corresponding row or column of each matrix. Such an arrangement is for example described in co-pending application No. 836,515.

In the particular arrangement described taking for example the row conductors, each of these pass first along a row of the top matrix in one direction say the forward direction and then pass in the reverse direction along the corresponding row of the next matrix underneath and then forwards again along the third matrix and so on, the conductors passing in alternate directions along successive matrices.

It will be appreciated that where there are a large number of rows or columns there will be a corresponding number of such wires arranged side by side and with a number of matrices superimposed, as above described, there is a chance that current loops may be set up and that interaction may occur between adjacent loops due to linkages occurring as a result of current flow along the conductors. This is liable to cause faulty operations.

According to the present invention a ferrite core matrix type store of the kind comprising a plurality of matrices has one set of conductors, i.e. rows or columns individual to each matrix, and the other set common to all the matrices and passing in one direction along each corresponding row or column as the case may be whilst threading the storage cores and in the opposite direction without threading the storage cores so as to tend to minimise the resultant external magnetic fields due to said conductors.

Preferably each conductor of said second set forms a current loop in each matrix and the adjacent loops of other conductors are so arranged that the induced currents are in opposite directions in successive matrices and substantially neutralise.

Preferably the conductors are lightly insulated, for instance, they may be enamelled wires; as the voltage difference between the forward and reverse turns is low the signal loss due to the insulation resistance may be made negligible without undue difficulty.

It will be appreciated that where the invention is applied to both line and column conductors the reverse turns will cross over each other and it may be desirable to employ additional insulation to avoid leakage between them, for instance, thin sheets of insulation could be interposed.

In order that the invention may be more clearly understood reference will now be made to the accompanying drawings, in which:

FIG. 1 is a pictorial view of a core store embodying the invention.

FIG. 2 shows diagrammatically one way of arranging the conductors in the core store in FIG. 1.

FIG. 3 shows diagrammatically the end connections in the arrangement of FIG. 2, and

FIG. 4 shows a modification of the arrangement shown in FIG. 2.

In FIG. 1 there is shown a number of matrices indicated by the references M1, M2 superimposed in a stack. These are shown as insulating plates carrying the ferrite cores and conductors, which for instance, may be formed on the plates by printed circuit techniques and the matrix plates themselves are mounted on support rods SR and separated by suitable spacers SP. In the arrangement shown in FIG. 1 the row conductors R1, R2 . . . are individual to each matrix and are provided with respective drive cores DC for setting the ferrite cores in accordance with well known arrangements. The column conductors C1, C2, on the other hand, extend in series through all the matrices and for flux neutralising purposes are provided with return conductors D1, D2. . . . Thus, the column conductor C1 passes from left to right along the matrix threading core stores on its way and it then returns from right to left, the return conductor being indicated by the reference D1. When D1 reaches the left end of the matrix it passes down through the end connections EC1 to matrix M2 and then passes forwardly along the first column, the operation being repeated successively down the stack of matrices.

In FIG. 2, in which for simplification only four row and four column conductors are shown, there is shown diagrammatically how the forward conductors C1 and the return conductors D2 may be arranged to form opposing current loops. Thus, C1 and D1 of matrix M1 form a current loop, as also do C1 and D1 of matrix M2. However, when the matrices M1 and M2 are placed one over the other it will be seen from the arrows that the stack of C1, D1 current loops are all polarised in the same direction whereas successive loops of the C2, D2 stack are in opposite directions so that induced voltages in adjacent loops of successive matrices will substantially neutralise. Similarly the loops in the C3, D3 stack all have the same polarity whereas those in the C4, D4 loop alternate.

Thus for example if current is flowing in the loops C2, D2 this will induce an E.M.F. in the loop C1, D1 of matrix M1 and will also induce an E.M.F. in the loop C2, D2 of matrix M2 but the E.M.F.'s in the two matrices will be in opposition and will neutralise.

It will be observed that the column conductors of matrix M1 are connected to amplifiers indicated above M1 as AMP1, AMP2 . . . and the column conductors extend successively down through the stack of matrices and finally following a return path to their respective amplifiers, the return path not being shown but indicated by earth connections. In order to obtain the current loops the positions of the forward passes C1 and the return passes D2 in each matrix are interchanged, the ferrite cores being indicated by the circles embracing the intersections of the line and column conductors.

In FIG. 2 there is shown one odd numbered matrix and one even numbered matrix in the stack and it is intended that the assembly shown will be repeated successively.

FIG. 3 shows diagrammatically the end connections for three matrices of the stack.

Whilst in the arrangement shown only the column conductors have been shown with compensating return connections, it follows that the row conductors may be similarly arranged and FIG. 4 shows how the matrix M1 of FIG. 2 could be modified to provide compensation for row conductors by providing compensating return conductors E1, E2.

What we claim is:

1. A ferrite core store comprising a plurality of matrices of core stores superimposed one over the other, a

set of conductors extending along respective rows of storage cores of each matrix and another set of conductors extending along respective columns of each matrix, a current loop associated with each conductor of at least one set, each said current loop including a forward pass in which the conductor threads all the cores and a reverse path in which the conductor does not thread the cores and series electrical connections between each current loop and corresponding current loops in the other matrices to form series circuits extending through all the matrices such that in each alternate stack all the loops have the same polarities and in the intervening stacks successive loops are oppositely polarised.

2. A ferrite core store comprising a plurality of matrices superimposed one over the other, a set of conductors extending along respective columns of each matrix and another set of conductors extending along respective rows of each matrix, electrical connections between corresponding conductors in successive matrices of at least one of said sets, the conductors of said set traversing forward passes along respective lines of cores in each matrix and threading each of said cores during said forward passes and return passes adjacent said forward passes but without threading the cores, each forward and reverse pass of a conductor forming a current loop and connections whereby currents induced in conductors in

series are in opposite directions in successive matrices.

3. A ferrite core store comprising a plurality of matrices superimposed, a set of conductors extending along the respective rows and another set of conductors extending along respective columns there being one of said sets individual to each matrix and the other set common to all the matrices the conductors of said second set making forward passes along respective lines of cores in each matrix and threading each of said cores during said forward passes and return passes adjacent said forward passes but without threading the cores, connections whereby each forward and reverse pass of a conductor forms a current loop and the relative senses of each loop and an adjacent loop in any matrix being opposite to the relative senses of the loops of the same conductors in adjacent matrices.

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