April 17, 1962 W. W. MOE ETAL 3,030,453

MAGNETIC WIRE SUPPORT FRAME

Filed March 13, 1958 2 Sheets-Sheet 1

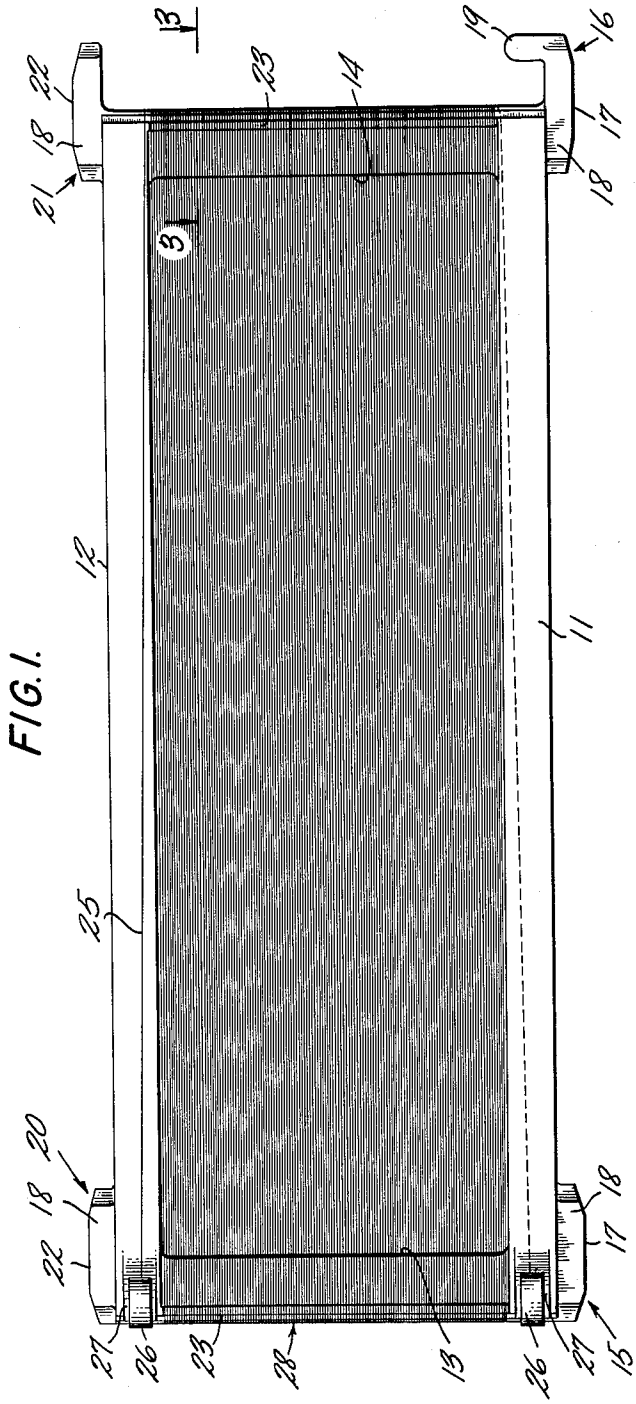


FIG. 1.

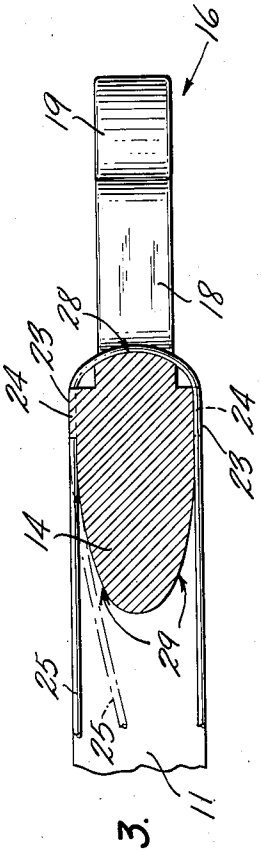


FIG. 3.

INVENTORS.
WILLIAM WEST MOE &
HERMAN D. PARKS

BY
Brumbaugh, Free, Graves & Donohue
their ATTORNEYS.

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MAGNETIC WIRE SUPPORT FRAME

Filed March 13, 1958 2 Sheets-Sheet 2

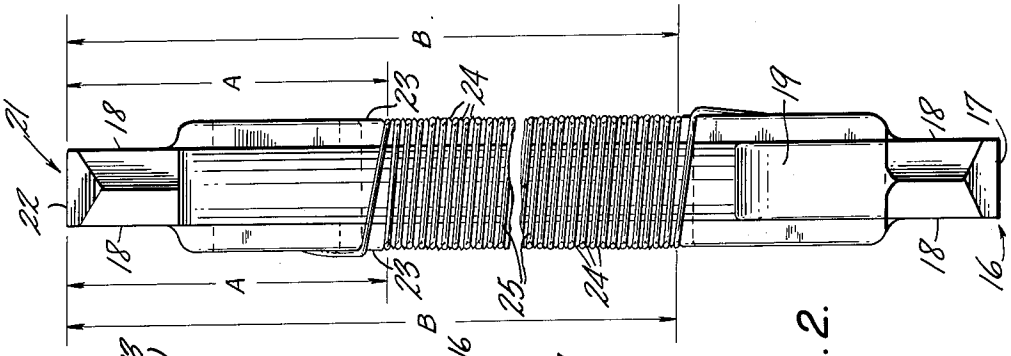


FIG. 2.

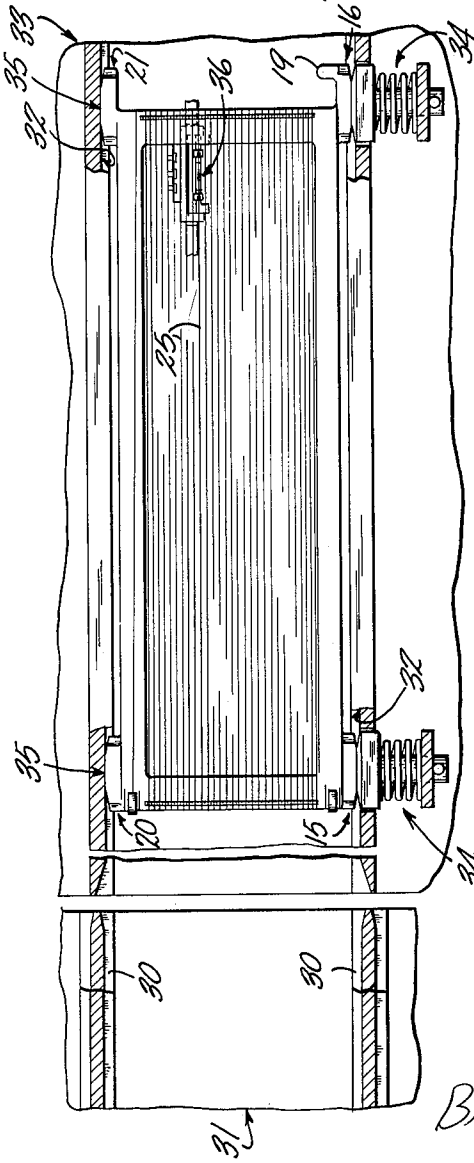


FIG. 4.

INVENTORS.
WILLIAM WEST MOE &
HERMAN D. PARKS

BY

Brumbaugh, Free, Graves & Donahue

their ATTORNEYS.

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MAGNETIC WIRE SUPPORT FRAME

William West Moe, Stratford, and Herman D. Parks, Norwalk, Conn., assignors to Time, Incorporated, New York, N.Y., a corporation of New York

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9 Claims. (Cl. 179—100.2)

This invention relates to frames supporting magnetic wire for recorded information and, more particularly, to a new and improved frame whereon a magnetic wire is arranged in a compact and efficient manner.

In memory apparatus wherein recorded information is stored for random access, each unit of information must be placed at a known physical location to enable automatic equipment to select and reproduce it. Many random access storage units of this type utilize a number of suitable lengths of magnetic wire suspended at predetermined positions on a frame, each wire being arranged to record a single information unit. Because of uncertainties in wire positioning and difficulties in wire mounting which require separate wires to be spaced at relatively large intervals, the volume occupied by most of the presently known wire frames is not used with maximum efficiency.

Accordingly, it is an object of this invention to provide frame supporting magnetic wires for random access memory in a compact and highly efficient arrangement.

Another object of the invention is to provide a wire frame of the above character wherein each magnetic wire is supported at an accurately determinable location.

A further object of the invention is to provide a wire frame of the above character wherein the wires are supported in a new and improved manner so that they may be depressed and traversed by a magnetic transducer without excessive stress.

These and other objects of the invention are accomplished by constructing a frame with spaced support arms and including guiding surfaces for sliding the frame in channels between a storage rack and wire reading apparatus. In one embodiment of the invention, the frame includes positioning surfaces separate from the sliding surfaces and an array of closely spaced magnetic wires mounted between the support arms and positioned in notches in each arm at predetermined distances from the positioning surfaces and parallel thereto. Maximum wire capacity for each frame is obtained by supporting two arrays of magnetic wires on opposite sides of the frame, the support arms having notched surfaces on each side. To this end, a single wire is wound around the frame to fit into each notch thereby providing a large number of parallel lengths of magnetic wire.

Further objects and advantages of the invention will be apparent from a reading of the following description in conjunction with the accompanying drawings in which:

FIG. 1 is a side view illustrating a typical magnetic wire support frame arranged in accordance with the invention;

FIG. 2 is an end view of the wire frame shown in FIG. 1;

FIG. 3 is a partial sectional view taken on the lines 3—3 of FIG. 1 and looking in the direction of the arrows; and

FIG. 4 is a view in elevation, partly in section, showing the support frame of FIG. 1 positioned in a reading apparatus.

As illustrated in FIG. 1, a representative magnetic wire support frame arranged according to the invention comprises a rectangular structure preferably fabricated

of aluminum alloy or the like having two horizontal stretchers 11 and 12 and two parallel vertical support arms 13 and 14 mounted between the ends of the stretchers. Projecting downwardly from each end of the lower stretcher 11, two feet 15 and 16 are formed with supporting and guiding surfaces 17 at the bottom and lateral guiding surfaces 18 on each side and have bevelled corners to enable the frame to slide in channels or the like from one position to another. At one end of the frame, the foot 16 extends beyond the support arm 14 and includes an upwardly projecting hook 19 by which the frame can be drawn into position.

In order to guide the top of the frame during a sliding motion, two projections 20 and 21 extend upwardly from the top stretcher 12 and are formed with similar guiding surfaces 18 on each side arranged to slide against the sides of a guiding channel. Inasmuch as the top surfaces 22 of these projections are not subjected to any sliding friction which might wear them down when the frame is moved in the manner described above, they are especially useful as reference surfaces for accurate positioning of the frame structure. To this end, these surfaces are machined flat and coplanar according to the degree of precision of vertical wire positioning desired, for example, within two thousandths of an inch. Although the guiding surfaces 18 on each side of the feet and the projections may be subject to some frictional action during transport of a frame, these are readily utilized for lateral positioning of the frame since slight variations in this direction are of no consequence.

As best seen in FIGS. 2 and 3, each of the support arms 13 and 14 is formed with a longitudinal ridge 23 projecting from each side beyond the lateral surfaces of the arm. In order to mount lengths of magnetic wire at known distances from the positioning surfaces 22, each of these ridges is formed with a series of transverse notches 24 at uniform intervals, the corresponding notches of each of the ridges being accurately located at the same predetermined distance from the plane of the surfaces 22. For example, the highest notch in each ridge is positioned within one thousandth of an inch of a predetermined distance A from the plane of the surfaces 22, as shown in FIG. 2, while the lowest notch is similarly located at a distance B from this plane.

The notches 24 are formed with their surfaces subtending an angle of approximately 60° in any suitable manner and with frames fabricated of aluminum alloy they are quite readily pressed into the ridges. In order to provide an array of recording wires on each side of the frame, a single magnetic wire 25 is wound around the frame to engage first the highest notch in each of the four ridges 23 so that it lies in a horizontal plane parallel to the plane of the surfaces 22. After completing one circuit of the frame in this manner, the wire is stepped to the adjacent group of corresponding notches by an angled path as it passes around the outside edge of the support arm 14, as best seen in FIG. 2, so that each length of wire is held parallel to the plane of the surfaces 22 by the notches 24. When the frame is completely wound, an adhesive cement or the like may be applied over the portions of the wire at each end of the frame, the ends of the wire 25 being secured to the frame at the top and bottom beneath the spring clips 26 adapted to snap into detents 27 formed in the frame.

In order to prevent sharp bends which might weaken the wire 25 and cause it to break, the outside edge 28 of each support arm is formed with an arcuate surface having a radius equal to approximately half the thickness of the frame, as best seen in FIG. 3. By bearing

against this radius between the ridges 23 on opposite sides of the support arm, the wire follows a semi-circular path having a large enough radius to prevent excessive local stresses. Furthermore, since the wire 25 is depressed inwardly toward the opposite side of the frame by a magnetic head during reading or recording, as illustrated in dotted lines in FIG. 3, both sides of the support arms are curved inwardly toward the center of the frame with a curvature of even larger radius to avoid sharp bends in the wire, these areas being designated by the reference numeral 29 in the drawings.

As one example of the compactness of frames constructed in accordance with the invention, two hundred and seventy-two lengths of magnetic wire capable of recording a like number of information units are supported on a single frame at vertical intervals of 0.020 inch, half of these being on each side of the frame. Thus, the height of the entire frame from the bottom surfaces 17 to the top surfaces 22 is less than four inches. The separation of the support arms 23 is, obviously, dependent in each case on the length of wire necessary to record the longest information unit and, in this case, is eleven inches, the entire frame length being less than a foot. Accordingly, the maximum dimensions of the representative frame occupy less than twelve cubic inches.

In operation, as illustrated in FIG. 4, the frame is withdrawn from its storage position between top and bottom channels 30 in a rack 31 into similar channes 32 in a wire reading mechanism 33 by suitable apparatus (not shown) engaging the hook 19. During this transport, it will be noted that the guiding surfaces 17 and 18 slide against the bottom and sides of the channels 30 and 32, but that the positioning surfaces 22 do not slide against any surface and thus are preserved from wear, both pairs of channels 30 and 32 being spaced at a distance greater than that between the surfaces 17 and 22.

When the frame has been drawn into the reading mechanism 33, suitable spring devices 34 are actuated in any well known manner to urge the frame upwardly so that the surfaces 22 engage corresponding flat and parallel surfaces 35 within the top channel 32. Thus, in order to read information from a selected length of wire, a magnetic head 36 within the reading mechanism is elevated to a distance from the surfaces 35 equal to the distance of the selected wire from the surfaces 22, placing it at the exact vertical location of the wire. The head is then moved toward the frame to engage the wire and depress it in the manner shown in FIG. 3 and is driven lengthwise along the wire to reproduce the recorded information in the usual manner. To return the frame to its storage position, the magnetic head is disengaged, the spring devices 34 are withdrawn, and the frame is pushed back into the channels 30 within the rack 31.

Although the invention has been described herein with reference to a specific embodiment, many modifications and variations thereof will readily occur to those skilled in the art. Accordingly, the invention is not intended to be restricted in scope except as defined by the following claims.

We claim:

1. A magnetic wire support frame each comprising a pair of parallel vertical support arms, means supporting the arms in spaced relation, foot means including at least two spaced foot members projecting downwardly from the bottom edge of the frame each having a surface transverse to the extent of the support arms for supporting the frame and lateral guiding surfaces enabling the frame to be guided in a lower channel, positioning means including at least two spaced positioning members projecting upwardly from the top edge of the frame each having lateral guiding surfaces enabling the frame to be guided in a channel and a positioning surface extending transversely to the direction of the support arms adapted to engage corresponding fixed surfaces to position the frame in the direction of the support arms, and means for supporting each of a plurality of magnetic record wires on the support arms in spaced relation to the plane of the positioning surfaces.

2. A magnetic wire support frame comprising a pair of parallel vertical support arms, means supporting the arms in spaced relation, foot means including at least two spaced foot members projecting downwardly from the bottom of the frame each having a horizontal surface for supporting the frame and lateral guiding surfaces enabling the frame to be guided in a lower channel, positioning means including at least two spaced positioning members projecting upwardly from the top of the frame, each having lateral guiding surfaces enabling the frame to be guided in an upper channel and a horizontal positioning surface adapted to engage corresponding horizonal surfaces by vertical motion to position the frame in the vertical direction, and means for supporting each of a plurality of magnetic record wires in spaced relation to the plane of thhe horizontal positioning surfaces.

3. A magnetic wire support frame comprising a pair of parallel vertical support arms, means supporting the arms in spaced relation, foot means including at least two spaced foot members projecting downwardly from the bottom of the frame each having a horizontal surface extending transversely to the extent of the support arms for supporting the frame and lateral guiding surfaces enabling the frame to be guided in a lower channel, positioning means including at least two positioning members projecting upwardly from the top of the frame each having lateral guiding surfaces enabling the frame to be guided in an upper channel and a horizontal positioning surface extending transversely to the extent of the support arms adapted to engage corresponding horizontal surfaces by vertical motion to position the frame in the vertical direction, notch means for receiving magnetic wire including a plurality of vertically spaced notches in each support arm, the corresponding notches in the pluralities being located at the same distance from the plane of the positioning surfaces, and magnetic wire recording means supported between corresponding notches in both arms.

4. A magnetic wire support frame comprising a pair of parallel vertical support arms, means supporting the arms in spaced relation, foot means including at least two spaced foot members projecting downwardly from the bottom of the frame each having a horizontal surface extending transversely to the extent of the support arms for supporting the frame and lateral guiding surfaces enabling the frame to be guided in a lower channel, positioning means including at least two positioning members projecting upwardly from the top of the frame each having lateral guiding surfaces enabling the frame to be guided in an upper channel and a horizontal positioning surface extending transversely to the extent of the support arms adapted to engage corresponding horizontal surfaces by vertical motion to position the frame in the vertical direction, notch means for receiving magnetic wire including two pluralities of vertically spaced notches in each support arm located on opposite sides of the frame, the corresponding notches in all the pluralities being located at the same distance from the plane of the positioning surfaces, and magnetic wire recording means supported between corresponding notches in both arms.

5. A magnetic wire support frame according to claim 4 wherein each support arm includes a longitudinal ridge on each side of the frame and each plurality of notches is formed in one of the ridges.

6. A magnetic wire support frame according to claim 4 wherein the magnetic wire recording means comprises a single wire wound around the frame to engage all the corresponding notches in each circuit and stepped from each group of corresponding notches to the next group at the outside edge of one of the support arms.

7. A magnetic wire support frame according to claim

6 wherein each support arm is curved inwardly on both sides toward the center of the frame with a radius of curvature greater than the thickness of the support arm.

8. A magnetic wire support frame according to claim 6 including an arcuate portion at the outside edge of both support arms guiding the magnetic wire in a semi-circular path from one side of the support arm to the other.

9. A magnetic wire support frame according to claim 8 wherein the radius of curvature of the arcuate portion is equal to approximately half the thickness of the support arm.

References Cited in the file of this patent

UNITED STATES PATENTS

1,089,518	Woodruff	Mar. 10, 1914
2,431,739	Eilenberger	Dec. 2, 1947
2,498,746	Walker	Feb. 28, 1950
2,620,389	Potter	Dec. 2, 1952

FOREIGN PATENTS

943,104	France	Sept. 27, 1948
639,634	Great Britain	July 5, 1950

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,030,453 April 17, 1962

William West Moe et al.

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 3, line 62, strike out "each"; column 4, line 20, for "thhe" read -- the --.

Signed and sealed this 31st day of July 1962.

(SEAL)
Attest:

ERNEST W. SWIDER
Attesting Officer

DAVID L. LADD
Commissioner of Patents