Sept. 19, 1967 G. BULLINGER 3,341,946

DRAWING APPARATUS

Filed Oct. 30, 1964

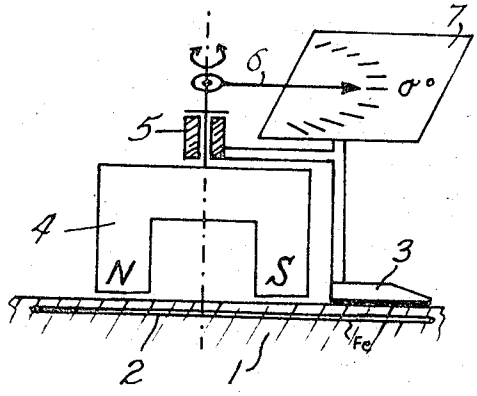

Fig. 1

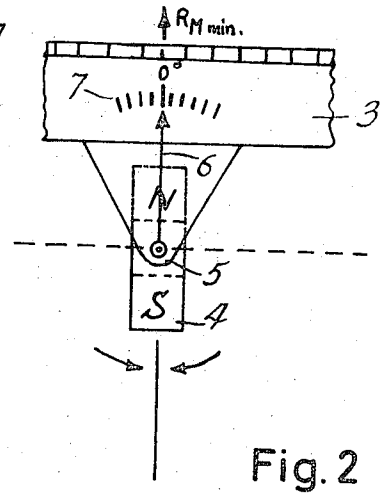

Fig. 2

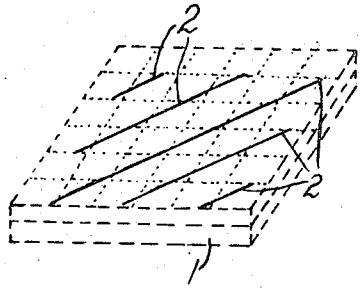

Fig. 3

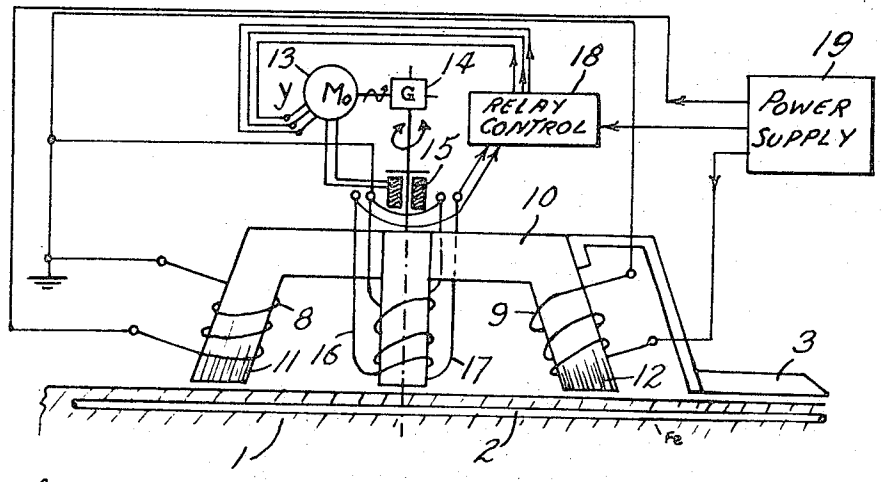

Fig. 4.

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6 Claims. (Cl. 33—76)

ABSTRACT OF THE DISCLOSURE

A drafting arrangement including a drawing board having embedded therein one or more sets of parallel narrow elongated magnetizable metallic members, this drawing arrangement including also magnetic means turnably about an axis normal to the drawing board and a drawing implement preferably mounted on the magnetic means.

The present invention relates to a drafting arrangement and, more particularly, consists in the combination of a drawing board consisting of insulating material, one or more sets of parallel narrow elongated magnetizable magnetic members embedded in the drawing board and magnetic means mounted turnably about an axis extending normal to the surface of the drawing board with the poles of these magnetic means located at a small distance from the surface of the drawing board so that the magnetic means interact with the magnetizable metallic members and is caused to turn into alignment with the same. The arrangement according to the present invention includes also a drawing implement preferably mounted on the magnetic means set forth above.

The novel features which are considered a characteristic for the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation will be best understood from the following description of a specific embodiment when read in connection with the accompanying drawing, in which:

FIG. 1 is an elevational view showing the construction on the drawing board and the magnetic arrangement above the board for obtaining alignment in a predetermined direction;

FIG. 2 is a plan view of the arrangement of FIG. 1;

FIG. 3 is a schematic diagram illustrating the principle for the construction of the drawing board through embedding of magnetizable members; and

FIG. 4 is a functional schematic diagram, and shows an electromagnetic arrangement whereby the alignment of the apparatus, in accordance with the present invention, is accomplished through the operation of a servo system.

Referring to the drawing, in FIG. 1 a series of parallel magnetizable wires **2** are embedded in non-magnetic or insulating material **1**. The material **1** corresponds to a drafting board. The wires **2** may be made, for example, of magnetizable iron. A permanent magnet **4** is located above the drawing board and in contact therewith. Due to the condition that a magnetic circuit will always seek the shortest possible path, the permanent magnet when placed on top of the drawing board **1**, tends to align itself with one or more of the wires **2**. If the magnet is

placed at an angle with respect to these wires rather than parallel therewith, the magnet will move and rotate so that it comes into alignment with the wires **2**. A housing **5** is rotatable about the axis of the magnet, and has attached thereto a ruler **3**. The housing **5** also has secured to it a scale **7** which can be placed, if desired, directly upon the ruler. An indicator **6** is rotatable about the axis of the housing and secured to the magnet. The scale **7** may be graduated in angular degrees. The apparatus is used by placing it upon the drawing board **1** and allowing the magnet **4** to align itself with respect to the wires **2** embedded within the drawing board. If now, for example, an angle of 0° is desired, the housing **5** is rotated until the scale **7** reads 0° with respect to the indicator **6**. In a similar manner, any other desired angle of the scale **7** and hence the ruler **3** may be obtained by rotating the housing so that the indicator points to the desired angle on the scale. FIG. 2 shows the relationship of the parts of FIG. 1 in a top view. FIG. 3 shows the drawing board with the megnetizable wires embedded in it.

In FIG. 4 the magnetic means is of the electromagnetic type. On the basis that such electromagnetic means cannot align itself in the direction determined by its field acting in conjunction with the embedded wires **2**, a servo positioning system is applied to actuate the magnet **10**. Thus, a magnetic field is established through the coils **8** and **9**. When this magnetic field is not in line with the embedded rods **2**, an error signal is induced within the coils **16** and **17**. The coil **16** is located precisely behind coil **17** in the drawing. This error signal is amplified through suitable relay control means and then drives a servo motor which in turn positions the magnet **10**, by being mechanically coupled thereto.

I claim:

1. A drafting arrangement comprising, in combination, a drawing board consisting of insulating material; at least one set of parallel narrow elongated magnetizable metallic members embedded in said drawing board of insulating material and extending parallel to the surface thereof and spaced from each other; support means adapted to be placed on said drawing board above said embedded magnetizable narrow elongated metallic members; magnetic means supported by said support means turnably about an axis extending normal to the surface of said drawing board with the poles of said magnetic means located at a small distance from said surface so that said magnetic means interact with said narrow elongated metallic members and is caused to turn into alignment with the same; and a drawing implement mounted on one of said means.

2. A drafting arrangement according to claim **1** wherein said magnetic means is a permanent magnet.

3. A drafting arrangement according to claim **1** wherein said drawing implement is a ruler.

4. A drafting arrangement according to claim **1** wherein said drawing implement is mounted on said support and said drafting arrangement includes a scale means and indicator means, one of said means secured to said drawing implement and the other of said means secured to the magnetic means and rotatable with the latter.

5. A drafting arrangement according to claim **1** including electromagnetic coils wound about said magnetic means and providing an electrical signal indicative of any misalignment of said magnetic means with respect

to said elongated metallic members; driving means coupled to said electromagnetic means for turning the same; a servo motor coupled to said driving means to provide power for operating the same and driving said magnetic means; relay means connected to said coils and to said servo motor; and an electrical power supply for energizing said coil and said motor so that said relay means operates said motor in a direction whereby said magnetic means achieves alignment with said elongated metallic members, the alignment position of said magnetic means corresponding to a null condition of the combined currents within said coils.

6. A drafting arrangement according to claim 5 wherein said drawing implement is a ruler secured to said magnetic means.

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