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[54] **MAGNET ARRANGEMENT FOR DATA PROCESSING DEVICES**

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[52] **U.S. Cl.** **335/266**, 335/267, 101/99

[51] **Int. Cl.** **H01f 7/08**

[58] **Field of Search** 335/266, 267, 268, 279, 335/282; 101/99

[56] **References Cited**

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[57] **ABSTRACT**

An electro-magnet device in which U-shaped magnetic core plates are provided and arranged one behind the other in staggered relation. Electric coils are placed over the legs of the core plates which are nearest each other. The stacked core plates with the respective coils are disposed adjacent corresponding armatures which are tiltably mounted on a support shaft extending perpendicular to the core plates. The electro-magnet arrangement is particularly useful for use with digital processing devices, especially for actuating the printing wheels thereof.

9 Claims, 3 Drawing Figures

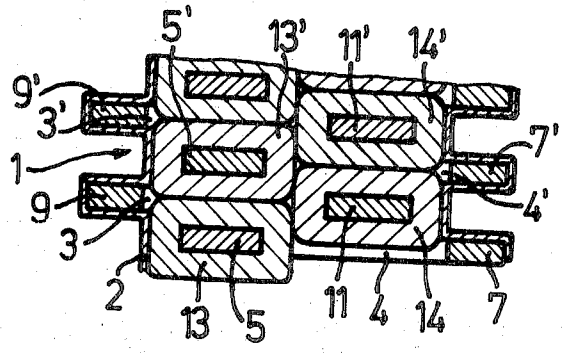


Fig. 1

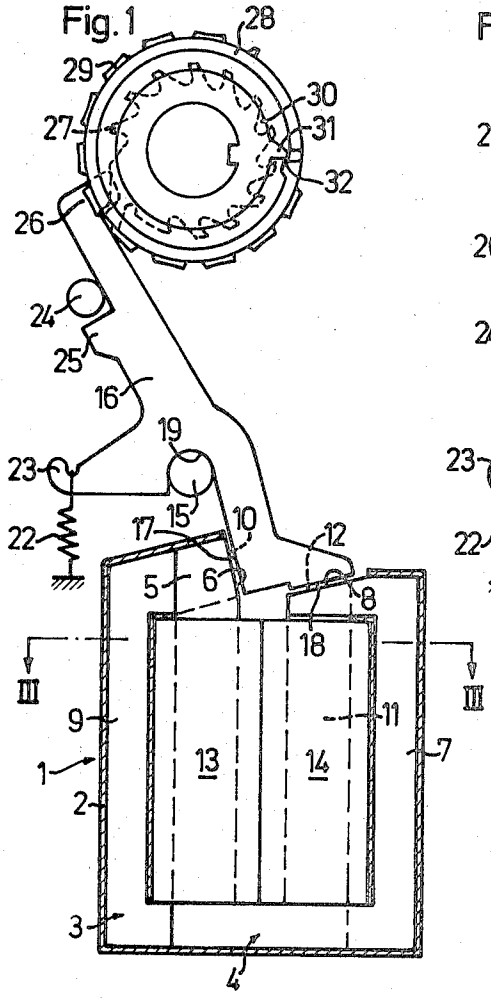


Fig. 2

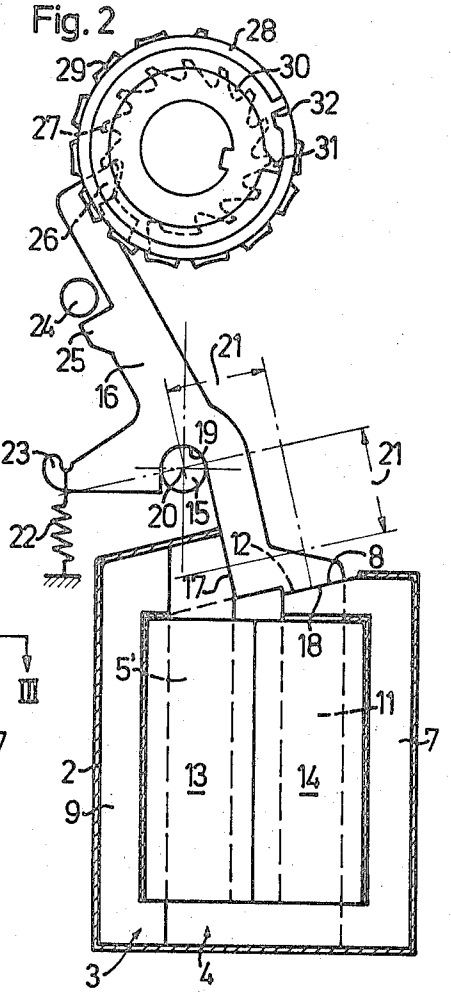
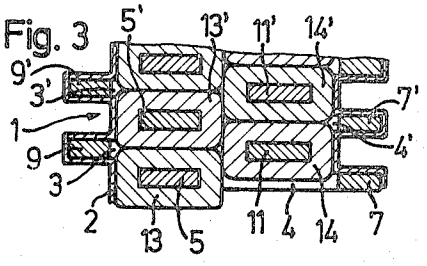


Fig. 3



MAGNET ARRANGEMENT FOR DATA PROCESSING DEVICES

The present invention relates to a magnet arrangement for data processing devices according to which the coils are in a manner of a register arranged on U-shaped core plates alternately in the front and in the rear, while the armatures are mounted on a single bolt.

A register-like arrangement of drop anchor magnets has become known according to which coils are in a manner of a register arranged in U-shaped core plates alternately in the front and in the rear, while pole surfaces located adjacent to each other when viewed in the longitudinal direction of the magnet arrangement form two rows. The pitch distance between the core plates corresponds approximately to the thickness of the coil winding plus the thickness of the core plate.

It is an object of the present invention to provide a magnet arrangement of a short length.

This object and other objects and advantages of the invention will appear more clearly from the following specification in connection with the accompanying drawing, in which:

FIG. 1 illustrates a magnet arrangement and a selector mechanism for a printing ring in its starting position.

FIG. 2 shows the selector mechanism of FIG. 1 in its working position.

FIG. 3 represents a cross-section through the magnet arrangement of FIG. 1.

The magnet arrangement according to the present invention is characterized primarily by core plates which are offset alternately toward the front and toward the rear and the pitch of which corresponds to half the width of the coil, while always one coil is at its end face side confined by coilless legs of adjacent core plates.

Referring now to the drawing in detail, a magnet arrangement 1 for a non-illustrated parallel printer comprises U-shaped core plates of magnetic material contained in a housing 2 of synthetic material. Two typical core plates 3, 4 will be described. These core plates 3, 4, which are also shown in FIG. 3 have different shapes. However, by suitably arranging the magnet coils with regard to the bolt 15, the core plates 3, 4 may be so designed that they have identical outer contour.

Each core plate 3, 4, is substantially U-shaped and are arranged in adjacent relation with the closed ends at the bottom and overlapping and with the legs parallel and the free ends of the legs uppermost. Core plate 3 has legs 9 and 11 with the upper free end of leg 9 extending angularly toward the free end of leg 11. Similarly, core plate 4 has legs 7 and 5 with the upper free end of leg 7 extending toward the free end of leg 5.

The free ends of legs 5 and 9 are formed parallel and coplanar to form pole faces 6 and 10, respectively. The free ends of legs 7 and 11 are also formed parallel and coplanar to form pole faces 8 and 12, respectively. Pole faces 6 and 8 are in alignment with each other in the plane of core plate 4 and pole faces 10 and 12 are in alignment with each other in the plane of core plate 3.

Placed upon the legs 5 and 11 are magnet coils 13, 14 with the same number of windings. Armatures 16, designed as pawls, and arranged one behind the other, correspond to the pole surfaces 6 and 8 and 10 and 12.

These armatures are pivotally arranged one behind the other on a bolt 15 stationarily arranged in a frame. As an example for these pawls, there will now in connection with FIG. 2 be described a pawl 16.

The pawl 16 has surfaces 17, 18 which correspond to the pole surfaces 6 and 8. For purposes of journalling the pawl 16 with bolt 15, the pawl 16 is provided with a recess 19. The surfaces 17, 18 are located at a right angle with regard to each other and have the same lever 21 with regard to the bolt axis 20. As a result thereof, a torque of the same magnitude is obtained on the pawl 16 and also on the pole surface 6 of the core plate 4 as well as for another pawl on the pole surface 12 of the core plate 3. A return spring 22 with low return force engages an arm 23 of the pawl 16. Moreover, there is provided an abutment bolt 24 which extends over all pawl 16. The pawl 16 when occupying its starting position engages the abutment bolt 24. A protrusion or nose 25 located below the bolt 24 and arranged on the pawl 16 surface has position safety means for the pawl 16. Furthermore a nose 26 is provided at the upper end of the pawl 16. This nose 26 is intended for engagement with teeth 27 of a type wheel 28. The circumference of the type wheel 28 carries types 29. A canceling ring 30 with canceling cam 31 is arranged co-axially with the type wheel 28. The canceling ring 30 and the type wheel 28 are rotatably journalled by devices not shown in the drawing.

According to the arrangement of FIG. 3, coils 13, 14, 13′, and 14′ are placed upon the core plates 3, 4, 3′, and 4′. The core plates 3, 4 are, when viewed from the observer, offset toward the left and toward the right by half the length of a coil 13 and 14 toward the side, and are furthermore offset by the width of a coil 13 in the longitudinal direction of the magnet arrangement 1. As a result thereof, a compact magnet arrangement 1 is obtained with a pole pitch of 2.54 mm and a coil pitch of 2×2.54 mm $= 5.08$ mm.

When selecting a type 29 on the type wheel 28 for a printing operation, the magnet 13 is supplied with current in a suitable instant. As receiving power for the magnet or magnets, 2.5 watts will suffice. In view of the current supplied magnet 13, the pawl 16 will against the thrust of the return spring 22 be pivoted from its starting position of FIG. 1 in clockwise direction into its working position of FIG. 2. The nose 26 of the pawl 16 engages the teeth 27 of the type wheel 28.

The shape of the teeth 27 is so designed that the nose 26 of pawl 16 is frictionally held in its working position so that the magnet 14 can be de-energized. The danger that the pawl 16 due to the force of the return spring 22 will drop off is eliminated in this manner.

After the type 29 has performed a printing operation, the canceling ring 30 is moved in clockwise direction. The canceling cam 31 will lift the pawl 16 out and will bring the same to its starting position in which it safely remains in view of the return spring 22. Subsequently, the canceling ring 30 will with its canceling cam 31 abut the abutment 32 of the type wheel 28 and will move the latter to its starting position shown in FIG. 1.

The low, short power absorption of 2.5 watts per magnet is in addition to the factors a) same torques on pawls 16, b) positive holding of pawl 16 in working position by teeth 27, c) positive return of pawl 16 by canceling ring 30, d) low returning force of returning spring 22, aided by e) the intended sticking of the pawl

16 with its surfaces 17, 18 to the pole surfaces 6, 8 as a result of which the air gap in the rest position of pawl 16 between the above-mentioned surfaces and the pole surfaces can be very small.

It is, of course, to be understood that the present invention is by no means limited to the specific showing in the drawing, but also comprises any modifications within the scope of the appended claims.

What is claimed is:

1. In a magnet arrangement, especially for data processing devices; a plurality of electric coils having the axes parallel and disposed in two rows with the coils in one row staggered relative to those in the other row, the coils in each row being in side by side relation and the rows being adjacent, generally U-shaped core plate means for each coil and each core plate means having one leg extending axially through a respective coil in one row of coils and the other leg extending axially along the outer side of the other row of coils, the free ends of said legs forming pole faces, an armature disposed near the free ends of the legs of each core plate means and operatively associated with the pole faces of the respective core plate means, and a single shaft member extending parallel to said rows of coils and at right angles to the axes of said coils and pivotally supporting said armatures.

2. A magnet arrangement according to claim 1 which includes housing means in which said coils and core plate means are mounted.

3. A magnet arrangement according to claim 1 in which the said other legs of each core plate means at the free ends thereof extend toward the said one leg of the respective core plate means into adjacent relation with the free ends of the legs of the core plate means which extend through coils adjacent the respective said other legs.

4. A magnet arrangement according to claim 1 in which each said coil is rectangular in transverse cross section, the larger dimension of each coil being parallel to the plane of the pertaining core plate means.

5. A magnet arrangement according to claim 4 in which the longer sides of the coils abut one another in each row while the shorter sides of the coils in each row abut the shorter sides of the coils in the other row.

6. A magnet arrangement according to claim 4 in which the distance between the centers of the adjacent coils in a row is greater than twice the thickness of a core plate means measured in the same direction.

7. A magnet arrangement according to claim 1 in which the coils in one row are polarized in a direction opposite to the coils in the other row when the coils are energized.

8. A magnet arrangement according to claim 1 in which each armature has end surfaces opposed to the pole faces of the respective core plate means, said pole faces and the respective end surfaces being so disposed relative to said shaft that equal torques are exerted on the armature by said end surfaces upon energization of the coil pertaining to the respective core plate means.

9. A magnet arrangement according to claim 1 in which each armature has end surfaces opposed to the pole faces of the respective core plate means, said end surfaces being flat and angularly related, said end surfaces cooperating with said pole faces to develop torque on said armature upon energization of the coil pertaining to the respective core plate means, a perpendicular erected from the center of each said end surface and representing the effective line of action of the magnetic force on each end surface passing by said shaft at one and the same radial distance.

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