Sept. 18, 1951 D. A. ARMSTRONG ET AL 2,568,479

MAGNETOSTRUCTURE AND METHOD OF MAKING THE SAME

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Fig. 2

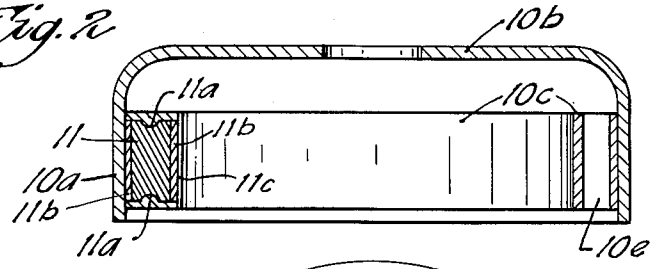


Fig. 1

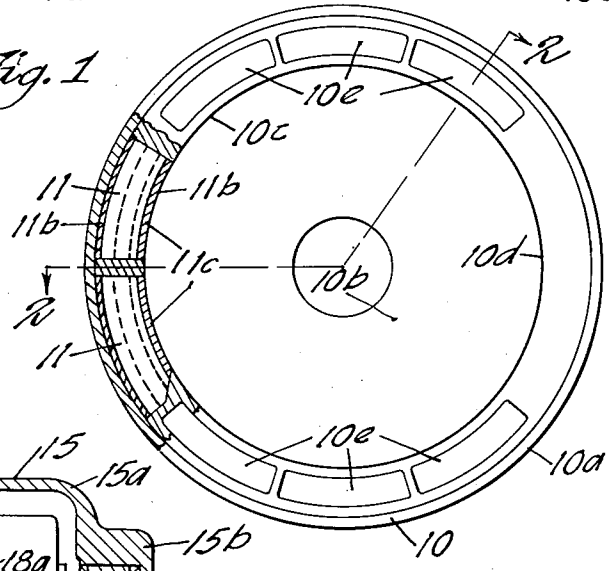


Fig. 4

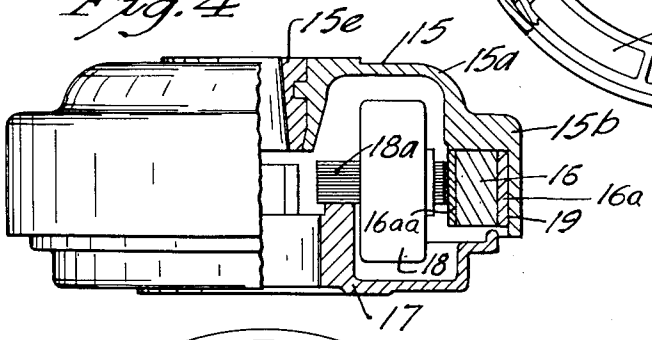
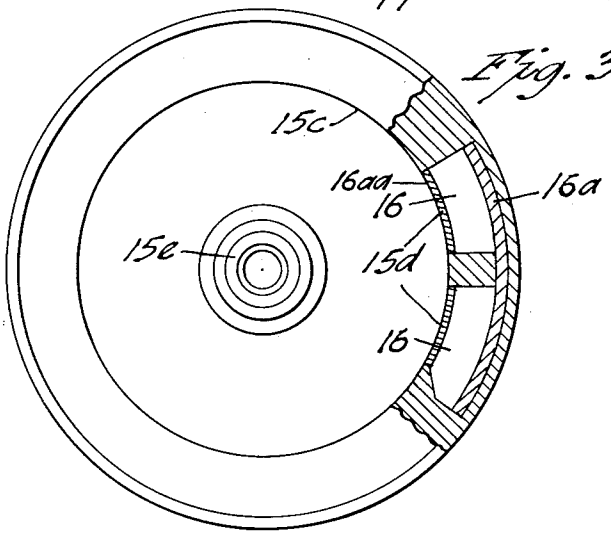


Fig. 3



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Fig. 5

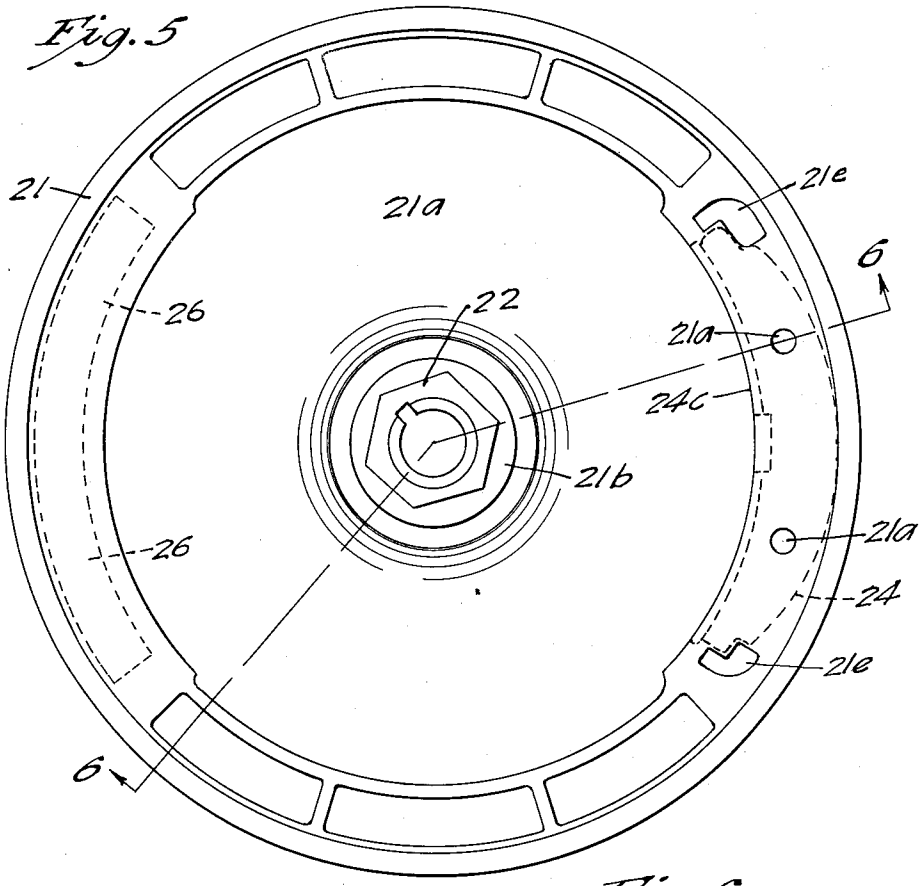


Fig. 6

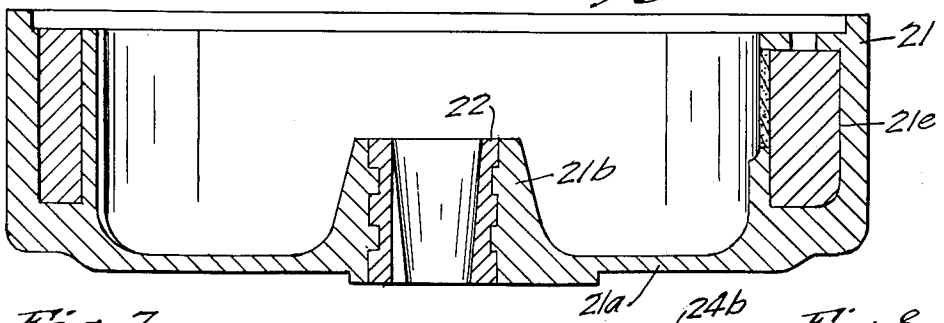


Fig. 7

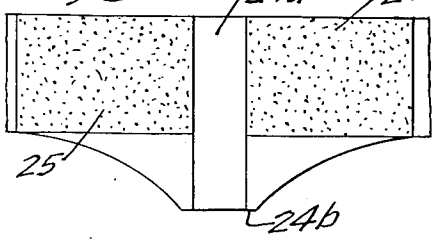
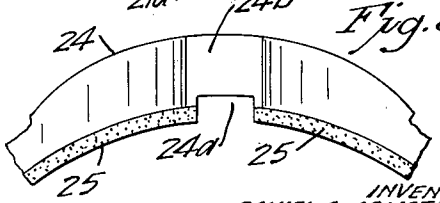


Fig. 8



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MAGNETO STRUCTURE AND METHOD OF MAKING THE SAME

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Application August 9, 1948, Serial No. 43,318

6 Claims. (Cl. 171—209)

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This invention relates to a magneto structure and method of making the same, and while the invention is applicable to many forms of magneto, it has been particularly designed for use on a magneto used with an outboard motor. In the type of magneto usually used with an outboard motor there is a rotating member which carries one or more magnets. In the operation of the magneto this rotating member carries the magnet past the core of a coil. It has heretofore been somewhat of a problem to secure the magnet in the rotating member and to have it carried in suitable magnetic material.

It is an object of this invention to provide a simple and efficient method for securing the magnet in its supporting member and for constructing said member to provide the necessary magnetic paths.

It is a further object of the invention to provide a simple and efficient method of forming a magnet which consists in spraying finely divided magnetic material against the polar faces of said magnet, which material adheres very closely and firmly to said magnet and can be finished as desired.

It is also an object of the invention to provide a simple and efficient method of securing two or more magnets in spaced relation in a supporting member having magnetically conducting portions which consists in providing magnets, to the polar faces of which a highly magnetic material has been added and casting the metal of said supporting member around said magnets, whereby a magnetic path is formed between said magnets by said magnetically conducting portions of said supporting member.

It is also an object of this invention to provide a simple and efficient method of forming a magneto structure which consists in providing a fixture, placing magnets in said fixture in spaced relation, spraying highly magnetic material against the polar faces of said magnets and between the adjacent ends thereof and then imbedding said magnets and magnetic material which form a unit in a non-magnetic casting.

It is still a further object of this invention to provide a magneto structure comprising a supporting member having one or more magnets cast therein, said magnets having the polar faces thereof formed of highly magnetic material which adheres very closely and firmly to said magnets and which can be finished as desired.

It is still another object of the invention to

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provide a method of forming a magnet which consists in spraying a highly magnetic material against the polar face of said magnet in finely divided condition whereby said material adheres very closely and firmly to said face.

These and other objects and advantages of the invention will be fully set forth in the following description made in connection with the accompanying drawings in which like reference characters refer to similar parts throughout the several views and in which:

Fig. 1 is a plan view of a rotatable supporting member adapted to carry one or more magnets, some parts being broken away and others shown in horizontal section;

Fig. 2 is a vertical section taken on line 2—2 of Fig. 1;

Fig. 3 is a plan view of a different type of rotatable supporting member adapted to carry one or more magnets, some parts being broken away and others shown in horizontal section;

Fig. 4 is a view partly in side elevation and partly in radial vertical section of a member shown in Fig. 3 and showing additional parts;

Fig. 5 is a plan view of a rotor adapted to carry a magnet;

Fig. 6 is a vertical section taken substantially on line 6—6 of Fig. 5, as indicated by the arrows;

Fig. 7 is a top plan view of a magnet used; and

Fig. 8 is a view in side elevation of said magnet.

Referring to the drawings, particularly Figs. 1 and 2, a member 10 is shown, the same being illustrated as substantially cylindrical in form, the same having an outer wall 10*a* and a top wall 10*b*, said walls merging at the upper corner of the device in curved form. Member 10 has an inner portion 10*c* which fits within wall 10*a* and which is also of cylindrical form. In practice, portion 10*c* is pressed within wall 10*a*. Portion 10*c* has an inner cylindrical surface 10*d* and said portion is of less height than member 10. While it could be variously formed, as shown in Fig. 2, portion 10*c* is spaced a slight distance from the bottom of outer wall 10*a* and the top of portion 10*c* is spaced some distance from top wall 10*b*. Member 10 will be suitably mounted for rotation on a member having a hub secured to the motor shaft. Reference is made to the previously filed application of Walter J. Raleigh, S. N. 689,876, filed August 12, 1946, on "Magneto," now Patent No. 2,537,856, issued January 9, 1951. Portion 10*c* is provided at opposite sides

with a plurality of openings 10e to lessen the weight of the device. In accordance with the present invention, magnets 11 are prepared and cast in spaced relation in portion 10c. These magnets have an iron alloy material of highly magnetic permeability secured to their pole faces. This material is secured to said faces by being sprayed thereagainst in finely divided condition and said material adheres very closely and firmly to said faces. Magnets 11 are shown as having grooves 11a formed therein in their top and bottom sides, which grooves are occupied by the cast metal of member 10c. This grooved structure assists in holding said magnets in place in member 10c. Said magnetic material is designated in Figs. 1 and 2 as 11b. Said iron alloy or magnetic material then extends at the inner and outer sides of said magnets 11 or along the pole faces thereof. In the form shown in Figs. 1 and 2, the outer annular portion 10a of member 10 will be made of magnetic material. The surfaces of the magnetic material at the inner sides of magnet 11 will then be finished in a true cylindrical surface 11c concentric with member 10 and substantially flush with surface 10d. The magnetic material 11b at the outer faces engages the inner surface of portion 10a and a very fine magnetic path is provided from magnets 11 to said outer portion 10a. A very fine magnetic path is also provided from magnets 11 to the surface 10f. Said outer wall or portion 10a forms a magnetic path between magnets 11. The material sprayed onto the polar faces of magnets 11 forms a superior magnetic path over structures having pole faces secured by mechanical means, each as by rivets, etc. The operation of spraying the magnetic material or iron alloy is usually done with a torch or gun especially constructed for that purpose. The metal usually is in the form of a wire or rod and is fed in at one end of the torch or gun and this metal is fused and forcibly projected in finely divided condition at the other end of the torch or gun. As stated, the metal adheres very closely and firmly to the polar faces of the magnet and becomes in effect an integral part thereof. In operation of the structure shown in Figs. 1 and 2, the surface 11c will be rotated in very close proximity to the core of a coil, such as the core 18a of coil 18 illustrated in Fig. 4.

Referring to Figs. 3 and 4, a member 15 is shown of annular form having a top portion 15a, downwardly curved sides and a lower annular portion 15b. Member 15 is shown as having a hub 15e secured therein which will be attached to the motor shaft and a member 17 is shown which will be supported on the motor frame and which forms a support for the core 18a of coil 18. Portion 15a has an inner cylindrical surface 15c. Member 15 will be made of non-magnetic material, such as aluminum, bronze, zinc or suitable alloys thereof.

In accordance with the present invention a pair of magnets 16 are provided. These magnets will be supported in a suitable fixture (not shown) and a layer of iron alloy as mentioned above will be sprayed onto the polar faces thereof and will thus be firmly secured to said faces. On the outer side this layer of highly magnetic material 16a will extend between said magnets, as shown in Fig. 3. The magnets and said material after being so sprayed will form a unit and will now be removed from said fixture and be suitably supported to be cast into member 15. Portion 16a will form a fine magnet path between magnets 16. The sprayed magnetic material or iron alloy at the inner side of magnet 16 is designated 16aa. This inner material 16aa will be finished in a true cylindrical surface 15d concentric with member 15 which will be substantially flush with surface 15c.

The layer of magnetic material 16a shown in Figs. 3 and 4 is necessary to form a magnetic path between magnets 16, since member 15 as above stated is of non-magnetic material. In operation the magnets 16 are carried past the core 18a and surface 15d of material 16aa passes in very close proximity to said core. A very fine magnetic path is thus provided by the material 16a and 16aa.

Referring to Figs. 5 to 8, a rotatable member is shown comprising a shell 21 having an end portion 21a which carries a hub 21b. Hub 21b is provided with a bushing 22 which is provided with a taper bore and a keyway for attachment to the rotor shaft. A double magnet 24 is provided, the same being shaped as shown in Figs. 7 and 8. Said magnet 24 is of general arcuate or crescent shape and has a groove 24a, rectangular in cross section extending transversely of its concave side. Said magnet also has a flat substantially rectangular portion 24b at its upper side. Magnet 24 will have a highly magnetic material, such as a special iron alloy, sprayed against the concave polar faces thereof, as shown in Figs. 5, 6 and 8. Magnet 24 will be suitably located in position by pins extending through openings 21a shown in member 21. Right angular shaped holes 21e are provided which also function to receive clamping members to hold said magnet 24 in position. Magnet 24 is then cast into member 21. It could be held in a receiving member 21 and metal cast about it after member 21 has been formed. After magnet 24 is cast in position the material 25 will be finished on a true cylindrical surface 24c concentric with member 21, Member 21 is shown as having therein a counterweight 26 adapted to balance the weight of magnet 24. Member 21 will be of magnetic material and there is thus a good magnetic path for the portions of magnet 24 at the outer sides thereof.

In operation member 21 will be rotated as usual and surface 24c will move in close proximity to the core of a coil, such as illustrated in Fig. 4. A very fine magnetic path is thus provided between the magnets and said core by the material 25 forming the polar face portions of said magnets. The magnetic path or path of the magnetic flux includes the small air gap between the polar face of the magnet 16 and the core 18a of the magneto. A highly effective and efficient passage of the flux is thus attained.

From the above description it will be seen that we have provided a simple and yet highly efficient magneto structure and method of making the same. The operation of spraying the iron alloy onto the magnets is easily and quickly performed and a highly magnetic pole face is thus provided and secured to the magnet in a greatly improved manner. This face can be easily finished along the desired surface. Our present structure is much less expensive than the ones heretofore used and results in greater magnetic efficiency. The structure and method have been actually demonstrated in actual practice and found to be very successful and efficient and will soon be in commercial production.

It will of course be understood that various changes may be made in the form, details, arrangement and proportions of the structure and in the steps and sequence of steps of the method without departing from the scope of applicants' invention, which, generally stated, consists in a method and structure capable of carrying out the objects above set forth, such as disclosed and defined in the appended claims.

What is claimed is:

1. The method of making a magneto structure comprising a rotor which consists in providing a pair of magnets having polar faces at one side thereof constructed to be disposed at one side of an air gap, spraying finely divided fused highly magnetic material onto the polar faces of said magnets to cause said material to adhere very firmly to said faces, holding said magnets in spaced relation and casting a rotor of magnetic material about said magnets with the sprayed material on the outer polar faces of said magnets very closely engaging a magnetic portion of said rotor whereby said rotor forms a magnetic path between said magnets and said sprayed material will be at the side of an air gap when said magnet is in operation.

2. The method set forth in claim 1, with the additional step of finishing the magnetic materials sprayed onto the inner polar surfaces of said magnets in a true cylindrical surface concentric with said rotor.

3. The method of forming a magneto having a rotor which consists in providing a pair of magnets having polar faces at opposite sides thereof respectively, holding said magnets in longitudinally spaced relation on a suitable fixture, spraying a layer of highly heated and fused highly magnetic material in finely divided condition onto said polar faces thereof to cause said material to adhere to said faces, forming the layer at the outer polar faces to extend between said magnets, removing said magnets and layers as a unit from said fixture, and casting said unit in a rotor and finishing said latter layers in a true cylindrical surface concentric with said rotor and disposing said surface at one side of an air gap in said magneto.

4. A magneto structure comprising a rotor having in combination, a pair of circumferentially spaced magnets, a rotor of magnetic material in which said magnets are carried, said magnets having layers of sprayed highly magnetic material on their inner and outer pole faces, the outer of said layers being in close engagement with a magnetic portion of said rotor whereby said rotor forms a magnetic path between said magnets and the inner of said layers being finished in a true cylindrical surface concentric with said rotor.

5. A magneto structure comprising a rotor having in combination, a pair of circumferentially spaced magnets, said magnets having layers of highly magnetic material sprayed onto the inner pole faces thereof and having a layer of highly magnetic material sprayed onto the outer polar faces thereof and extending between said magnets and a rotor of non-magnetic material in which said magnets are cast whereby said outer layer forms a magnetic path between said magnets.

6. A magneto structure comprising a rotor, having in combination, a twin magnet having circumferentially spaced polar faces at its inner side, layers of highly magnetic material sprayed onto said inner faces and forming an integral part of said faces and a rotor of magnetic material in which said magnet is cast, said layers of highly magnetic material being finished in a true cylindrical surface concentric with said rotor and being located at one side of the air gap in said magneto.

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