May 18, 1965 A. K. BEY 3,184,654

MAGNETIC HOLDING DEVICE

Filed June 14, 1962

fig.1.

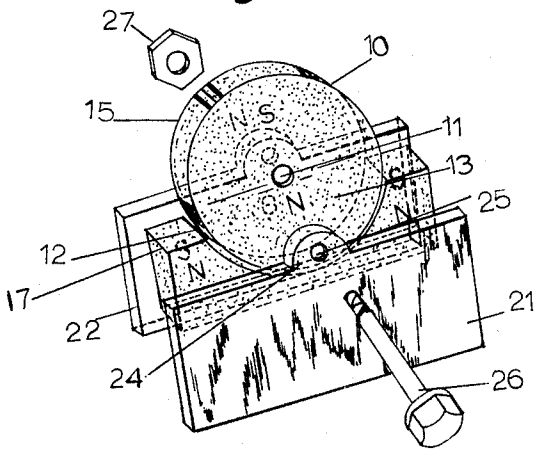


fig.2

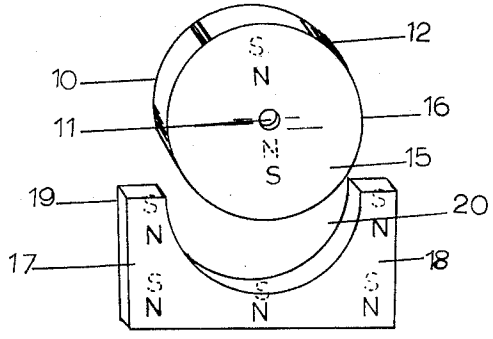


fig.3.

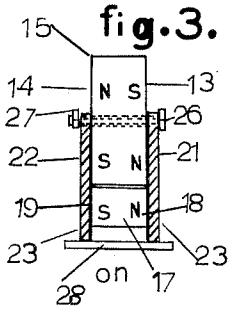
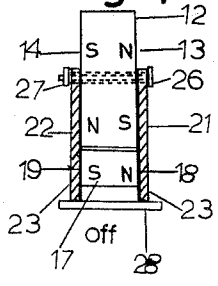


fig.4.



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MAGNETIC HOLDING DEVICE

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The instant invention relates to magnetic holding devices. Particularly, it relates to magnetic apparatus adapted for use as what is commonly known in the art as base holders.

There is a frequent need for temporary anchoring of portable instruments and tools while they are in use. The requirement is coupled with a need for easy removal from anchored position. Magnetic holders in the bases of tools and the like have been employed for this purpose; however, removal from the anchored or gripped position of such devices requires tugging or pulling to break the magnetic grip. Constant application of such forces causes wear or stress on the portable tools which may result in breakage thereof.

A need is present for an improved magnetic base holding apparatus which minimizes the stress of removal from gripped positions on the device in connection with which the same is employed. Accordingly, and as an object of this invention, there is provided an improved magnetic apparatus adapted for use as a base holder.

It is a further object of this invention to provide a magnetic apparatus adapted for use as a base holder in which the force of the magnetic field can be turned on and off.

It is another object of the invention to provide an apparatus of the class described in which the magnetic field can be adjusted from maximum strength through a range of intensity down to zero.

A yet further object of the invention is to provide a magnetic apparatus adapted for use as a base holder in which a permanently magnetized member is rotatable near a second permanently magnetized member to magnetically energize a pair of magnetizable pole pieces of low magnetic retentivity, whereby the intensity of the magnetic field may be selectively adjusted as the first magnetic member is rotated.

It is still another object of the invention to provide, in an apparatus of the described class, a first permanently magnetized member rotatable near a second permanently magnetized member to gradually energize and de-energize magnetic pole pieces of low magnetic reluctance, the first magnetic member having a pair of North polar areas and a pair of South polar areas, with each North polar area and each South polar area being on opposite surfaces of the first permanently magnetized member.

Other and further objects of the invention will become apparent from the following description and appended claims, reference being had to the accompanying drawings and the numerals of reference thereon.

On the drawings:

FIG. 1 is a perspective view of an apparatus embodying one form of the invention with components thereof blown apart for the purpose of illustration.

FIG. 2 is a perspective view of the permanent magnets shown in FIG. 1 blown apart for the purpose of illustration.

FIG. 3 is a vertical sectional view of the apparatus shown in FIG. 1 and illustrating the gripping or "On" position.

FIG. 4 is a vertical sectional view of the apparatus shown in FIG. 1 and illustrating the non-gripping or "Off" position.

Referring now more particularly to the drawings, a preferred embodiment of the device or apparatus comprises a disc **10** having a central aperture **11**. The disc **10** is

a permanent magnet of high magnetic retentivity. It is preferably of ceramic fabrication which facilitates and permits polarization through the thickness of the material.

Referring to the drawings, it is observed that one semi-circular portion **12** of the disc **10** is polarized with the North pole on face **13** of said disc and the South pole on face **14** of said disc; while the other semi-circular portion **15** of disc **10** is polarized so that the North pole is on face **14** of the said disc **10** and the South pole is on face **13** of said disc. This construction results in disc **10** having a pair of semi-circular faces comprising face **13** with a North magnetic polarity on one of said semi-circular faces, and a South polarity on the other of said semi-circular faces, with each of the poles on face **13** being opposite an opposed pole on face **14** of disc **10**.

The foregoing construction provides an imaginary band **16** disposed diametrically between disc portions or sections **12** and **15** which is substantially free from consequential magnetic force. While, theoretically, band **16** is no more than the line of juncture between portions or sections **12** and **15**, in most practical applications, the width of the band **16** may be wider than a mere line, without consequential effect in the operation of the instant apparatus.

A second permanent magnet **17** of high magnetic retentivity is provided. The second magnet **17** is preferably of substantially the same thickness as the disc **10**. The permanent magnet **17** is also preferably of ceramic fabrication which lends to the permanent magnetization through the thickness of the material—that is, transverse of the longitudinal axis of magnet **17**, so that the North polarity of the magnet **17** is on face **18**, while the South polarity of magnet **17** is on face **19**.

The permanent magnet **17** has a substantially semi-circular opening **20**, as illustrated in FIG. 2. The radius of curvature of the semi-circular opening **20** is just slightly longer than the radius of curvature of the disc **10**. Such construction will permit approximately one semi-circular portion of the disc **10** to be disposed in the opening **20**, while the other semi-circular portion of the disc **10** is disposed outwardly of the opening **20**.

The permanent magnet **17**, in the embodiment illustrated, is flat-sided. A pole piece **21** is mounted adjacent face **18**, and a pole piece **22** is mounted adjacent face **19**. The pole pieces **21** and **22** are fabricated from a magnetizable material, such as steel or other ferrous material, having a low magnetic reluctance. However, the pole pieces are not magnetic retainers. Thereby, the pole pieces may be readily magnetized or de-magnetized depending upon the application of magnetic energy.

The pole pieces, in the instant embodiment, are flat-sided and are secured to the respective faces of magnet **17** by suitable means, such as synthetic resin or the like, well known to those skilled in the art.

The height of the pole pieces **21** and **22** is such that, when the pole pieces are mounted adjacent the magnet **17** in the desired position, magnetic gripping pole piece extensions **23** extend beyond the magnet **17**, as illustrated in FIGS. 3 and 4. Each of the pole pieces has preferably central integral apertured ear-like extensions **24**, one of which is clearly shown in FIG. 1 and the other of which is shown in dotted lines. The apertures **25** of such extensions **24** are disposed in alignment substantially with the center of, and perpendicular to, the radius of the curve defining opening **20**. This brings the extensions **24** to the level of the band **16** to preclude undesirable magnetic effect on the pole pieces **21** and **22** when the disc **10** is in any of the positions illustrated in the drawings, or in any other operative position.

An axle provided by a headed pin or bolt **26** extends through the apertures **25** and the aperture **11** to provide

a mounting for the disc 10. It is appreciated that the center of disc 10, when mounted, is substantially coincident with the center of curvature of opening 20. To secure the pin or bolt 26, a nut 27 is provided. Inasmuch as the bolt 26 and the nut 27 are under the influence of band 16, any suitable fabrication may be employed. However, I prefer fabrication from a preferably non-magnetic material.

To facilitate a more ready understanding of the invention, I have used the conventional letters "N" and "S" to designate, respectively, North and South poles throughout the drawings. In the operation of the device, the pole pieces 21 and 22 are energized to maximum gripping strength when the device is in the position illustrated in FIGS. 1 and 3. That is to say, when the semi-circular section 12 is substantially wholly within the opening 20, the North pole of magnets 17 and the North pole of face 13 are adjacent each other and create or induce a North polar pole piece 21. Accordingly, the South poles of face 14 and magnet 17 are adjacent each other, creating or inducing a South polar pole piece 22. This will result in the maximum grip being exercised on, for example, a base or other piece 28 through extensions 23 because all of the magnetic energy of the device is contained in the circuit comprising the pole pieces 21 and 22.

As the disc 10 is rotated in any direction from the position shown in FIG. 3, the polarity in the pole pieces gradually diminishes because of their low retentivity by gradual dissipation of the magnetic effect as the semi-circular portion 15 is brought into the opening 20. When substantially the entire semi-circular section 15 of the disc 10 is in the opening 20, as illustrated in FIGS. 2 and 4, the dissipation of the magnetic energy in pole pieces 21 and 22 is complete, because on each side adjacent the pole pieces in disc 10 and in the permanent magnet 17 there are North and South magnetic fields which attract each other and, consequently, there is no gripping effect between the extensions 23 and the base 28. Accordingly, a held tool or apparatus can be released from base 28 without pulling.

As many changes or substitutions could be made in the above described construction, and as many apparently widely different embodiments of the invention within the scope of the claims could be constructed without departing from the scope and spirit thereof, it is intended that all matter contained in the accompanying specification shall be interpreted as being illustrative and not in a limiting sense.

I claim:

1. A magnetic device comprising a permanent magnet with opposite poles disposed transversely of the longitudinal axis thereof; a permanently magnetized disc mounted for rotation of the circumference thereof in and out of said permanent magnet, said disc having North and South poles disposed on opposed faces of said disc, and a pair of pole plates mounted adjacent the polar faces of the permanent magnet whereupon rotation of said disc the pole plates can be selectively magnetized and depolarized.

2. A magnetic device comprising a permanent magnet having therein a depression, said permanent magnet having opposite poles disposed transversely of the longitudinal axis thereof; a permanently magnetized rotatably mounted disc partially disposed in and partially disposed out of said depression, said disc having on each face thereof a pair of opposite poles with the poles on each face disposed opposite an opposing pole on the oposite face, and a pole plate secured adjacent each polar face of said permanent magnet, whereupon rotation of said disc the pole plates can be selectively polarized and depolarized.

3. A magnetic device comprising a substantially flat-sided permanent magnet having a semi-circular opening, the polarity of said permanent magnet aligned from side to side; a disc mounted for rotation in said opening, substantially one-half of said disc permanently magnetized with each side of said disc having a permanent North and South pole; a pair of pole plates mounted adjacent the polar faces of said permanent magnet and limited in height to about the center of said disc, whereupon rotation of said disc said pole plates can be selectively polarized.

4. A magnetic device comprising a flat-sided permanent magnet having a substantially semi-circular opening and magnetized with polarity aligned transversely to the longitudinal axis thereof; a disc having a radius of curvature less than the radius of curvature of the semi-circular opening and with a pair of opposite poles on each face thereof, said disc mounted for rotation in said semi-circular opening; magnetizable pole plates mounted adjacent the sides of said permanent magnet; a non-magnetic member connecting said pole plates together and providing an axis of rotation for said disc whereby the pole plates can be selectively polarized on rotation of said disc.

5. A magnetic device comprising a permanent magnet having a substantially semi-circular opening and magnetized with polarity aligned transversely to the longitudinal axis thereof; a pair of magnetizable pole plates secured adjacent the sides of said magnet; a non-magnetic member mounted in an end of said pole plates; a permanently magnetized disc comprising integral halves mounted on said non-magnetic member and rotatable in said semi-circular opening, the polarity of each half of said disc aligned through the thickness of said disc in a direction opposite to the other half thereof, whereby the magnetic energy in the pole plates can be selectively adjusted.

6. A magnetic device comprising a flat-sided permanent magnet; a pair of magnetizable pole pieces secured on opposite sides of said permanent magnet, a second permanent magnet rotatable adjacent said flat-sided magnet between said pole pieces, whereby the pole pieces are energized and de-energized as said second magnet is rotated.

7. The magnetic device defined in claim 6 in which the flat-sided magnet has a substantially semi-circular opening in which the second magnet is rotatable.

8. The magnetic device defined in claim 7 in which the second magnet rotates about the center of the semi-circular opening in said flat-sided magnet.

9. The magnetic device defined in claim 7 in which the flat-sided magnet has a substantially semi-circular opening about the center of which said second magnet rotates; the polarity of said flat-sided magnet aligned transverse to the plane of rotation of the second magnet, each side of the second magnet having a North and a South polar area opposite a dissimilar magnet area on the other side of said second magnet.

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