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RELEASABLE PERMANENT MAGNET HOLDING DEVICE

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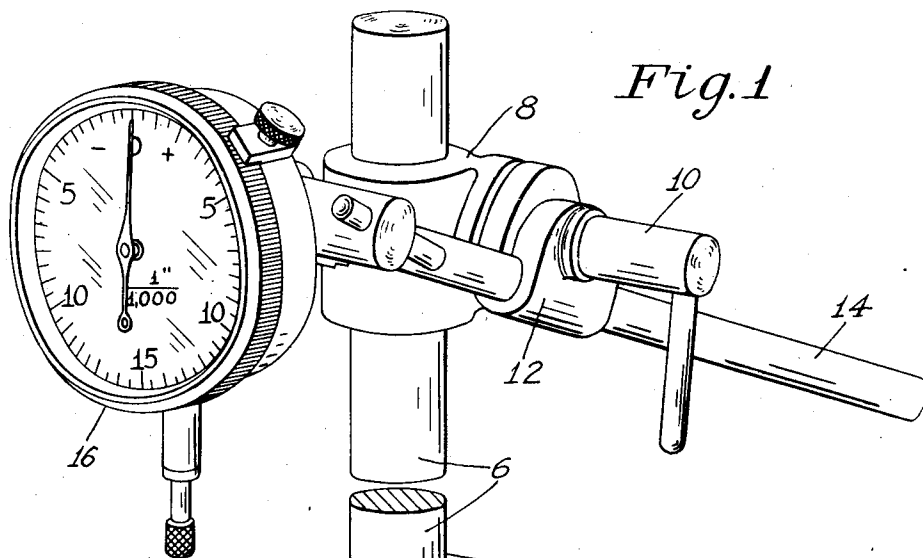


Fig. 1

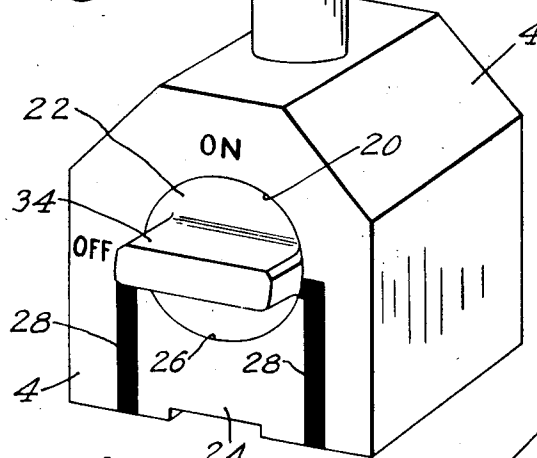
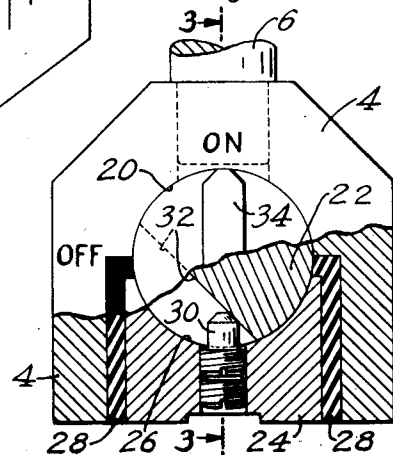
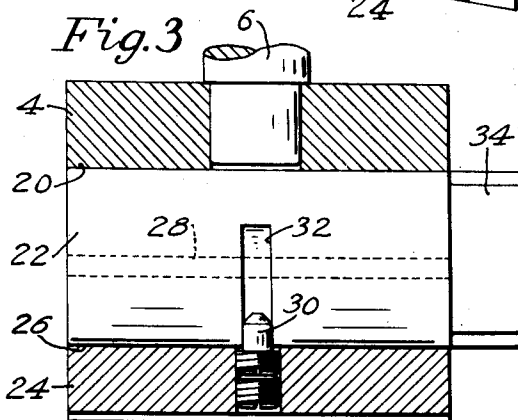


Fig. 2



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RELEASABLE PERMANENT MAGNET
HOLDING DEVICE

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2 Claims. (Cl. 175—367)

The present invention relates to improvements in releasable permanent magnet holding devices, and more particularly to a holding device of the general description which includes a magnetic holding member having magnetic conductors and a permanent magnet associated therewith, and means for controlling the flow of magnetic flux in a magnetic holding circuit including the magnetic conductors to hold or to release any part which may be magnetically attracted to the holding member.

The invention is herein disclosed as embodied in a magnetic base for a dial test indicator which is adapted for use on machine tools. It is to be understood, however, that the invention is not limited in its application to a magnetic base of this description, but is equally applicable in any instance where it is feasible and desirable to secure one part to another by magnetic attraction as, for example, in the manufacture of non-electric magnetic chucks.

It is a principal object of the present invention to provide a novel and improved releasable permanent magnet holding device of this general description which is simple and compact in its construction, and is also most efficiently arranged for controlling the disposition of the magnetic lines of flux to strongly hold and to release magnetically attracted parts.

With this and other objects in view as may hereinafter appear, a feature of applicant's invention consists in the provision of a magnetic holding device including a magnet preferably, but not necessarily, cylindrical in cross-section and having the magnetic poles thereof disposed transversely of its longitudinal axis, and magnetic conductors arranged to cooperate with the magnet to control the flow of magnetic lines of flux to establish a magnetic holding circuit, or to render the same ineffective as desired.

Other features of applicant's invention consist in the specific construction and arrangement of the magnetic holding assembly including the parts above described, in which the portions of the magnetic conductors contacting with the magnet, take the form of substantially semi-cylindrical bearing surfaces separated by non-magnetic areas, and in which the magnet is supported for rotational movement between an "on" position in which a magnetic flux of maximum strength is directed through a holding magnetic circuit including the conductors, and an alternative "off" position in which the magnetic flux is shunted through each of the conductors

directly from one pole of the magnet to the other.

The several features of the invention consist also in the devices, combinations and arrangement of parts hereinafter described and claimed, which together with the advantages to be obtained thereby will be readily understood by one skilled in the art from the following description taken in connection with the accompanying drawing, in which Fig. 1 is a perspective view of a dial test indicator with a magnetic base embodying in one form the several features of applicant's invention; Fig. 2 is a view in front elevation of the magnetic base with a portion of the same broken away, and the underlying parts shown on a section extending through the middle of the base; and Fig. 3 is a sectional view taken on the line 3—3 of Fig. 2.

The dial test indicator with its magnetic base illustrated in the drawing as embodying one form of applicant's invention, comprises a magnetic base the outer shell of which is designated at 4, and a dial test indicator assembly including a standard 6, a clamp 8 carrying a cross arm 10, a clamp 12 attached to the cross arm 10, and a forwardly extending arm 14 held in the clamp 12 which serves to support a dial indicator 16 of ordinary description.

The magnetic base disclosed in the drawing as embodying in a preferred form the several features of applicant's invention, comprises the outer shell 4 having roughly the shape of an inverted U. Extending transversely through the upper end of the outer shell 4, is a semi-cylindrical bearing surface 20 in which is received a cylindrical magnet 22. The magnet 22 is held in place by means of a plug 24 which is fitted into the remaining space between the two arms of the U-shaped shell 4, and has formed in the upper side thereof, a cooperating semi-cylindrical bearing surface 26 for the cylindrical magnet 22. The plug 24 is separated from the two arms of the U-shaped shell 4 by thin sheets of non-magnetic material 28 forming non-magnetic insulating areas which extend from the surface of the cylindrical magnet 22 at opposite sides thereof, to the bottom holding surface of the magnetic base. As best shown in Figs. 2 and 3, the cylindrical magnet 22 is held in place by means of a pin 30 screw-threaded into the bottom of the plug 24 for engagement in a transverse slot 32 formed in the middle portion of the cylindrical magnet 22. The pin 30 cooperating with the slot 32 serves to prevent endwise movement of the magnet 22, and permits rotational movement

through a 90° angle between the designated "on" and "off" positions, as indicated by the position of the manually operable knob 34 on one end of the magnet.

The magnet 22 is magnetized in such a manner as to cause the opposite poles to be disposed transversely of the longitudinal cylindrical axis toward diametrically opposite sides thereof. In the illustrated embodiment of the invention, the magnet is magnetized in the transverse direction indicated by the knob 34 which serves also as an indicator arrow. It will readily be seen that for the "on" position of the magnet, the magnetic lines of flux pass through a magnetic holding circuit extending from the upper pole of the magnet, through the magnetic conductor provided by the outer shell 4, downwardly through the arms of this U-shaped member 4 to the face or holding surface of the base. Assuming that the base is engaged against a magnetizable machine part, the lines of magnetic flux then pass through the said machine part, and thence upwardly through the magnetic conductor provided by the plug 24 to the bottom or oppositely polarized side of the magnet.

While the base will ordinarily be placed with the bottom surface shown in the figures of the drawing, in contact with the machine, it may sometimes be desirable to position the base in such a manner that the standard 6 will be parallel to the supporting surface of the machine. Under these conditions it has been found that the end of the base opposite the knob 34 may be employed as a magnetic holding surface, and that a very strong magnetic holding circuit will be maintained for this position of the base. The magnetic lines of force originating in the magnet will be circulated from one pole to the other through that portion of the machine surface contacting the end of the magnet. Additional lines of force will pass through the U-shaped member 4 into the surface of the machine part contacting the rear end of the holding member, and thence will pass through the block 24 to the opposite pole portion of the magnet 22.

It will be understood that the invention is not limited to the specific embodiment shown, and that various deviations may be made therefrom without departing from the spirit and scope of the appended claims.

What is claimed is:

1. An instrument base of the class described

comprising a rotatable cylindrical magnet having the magnetic poles disposed transversely of the longitudinal cylindrical axis and on diametrically opposite sides thereof, and a magnetic holding member in which the magnet is supported for rotational movement comprising a U-shaped magnetic conductor forming the outer shell of the instrument supporting base and providing in the base of the U-shaped portion thereof a semi-circular bearing contact with the magnet, a second magnetic conductor located between the arms of the U, and providing a second semi-circular bearing contact member for the magnet, non-magnetic material separating the magnetic conductors, and means for rotating the magnet in the holding member from a holding position to a releasing position, said magnet having formed therein a transverse slot, a stop pin on the holding member engaging in said slot to prevent axial movement of the magnet and to prevent rotational movement thereof beyond said magnetic holding and releasing positions, and means for rotating the magnet.

2. An instrument base of the class described comprising a rotatable cylindrical magnet having the magnetic poles disposed transversely of the longitudinal cylindrical axis and on diametrically opposite sides thereof, and a magnetic holding member in which the magnet is supported for rotational movement comprising a U-shaped magnetic conductor forming the outer shell of the instrument supporting base and providing in the base of the U-shaped portion thereof a semi-circular bearing contact with the magnet, a second magnetic conductor located between the arms of the U, and providing a second semi-circular bearing contact member for the magnet, and thin sheets of non-magnetic material separating the magnetic conductors, said magnetic holding member being shaped to provide a plane magnetic holding surface comprised by said conductors and separating non-magnetic material extending substantially parallel to the magnetic rotational axis, a second magnetic holding surface comprised by said conductors, separating non-magnetic material, and the magnet extending in a plane substantially normal to the magnet rotational axis, and means disposed at the opposite end of the magnet from said second holding surface for rotating the magnet.

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