

May 7, 1963

E. UC ETAL

3,089,066

MULTIPURPOSE MAGNETIC HOLDER WITH PERMANENT MAGNET

Filed May 27, 1960

4 Sheets-Sheet 1

Fig. 1

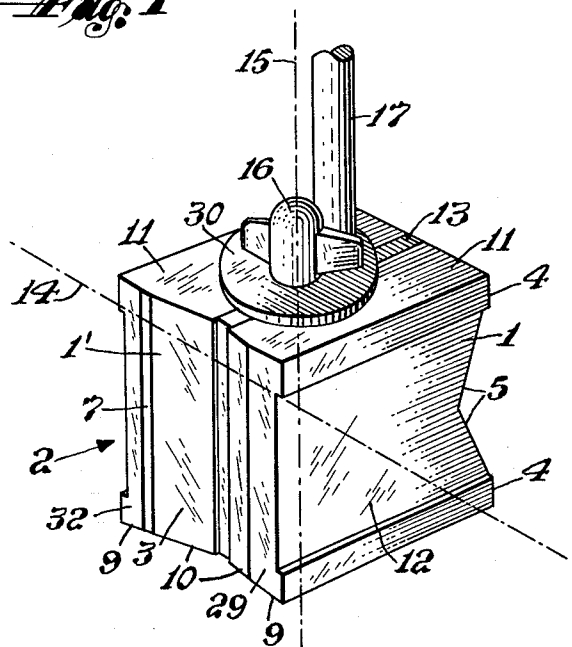


Fig. 2

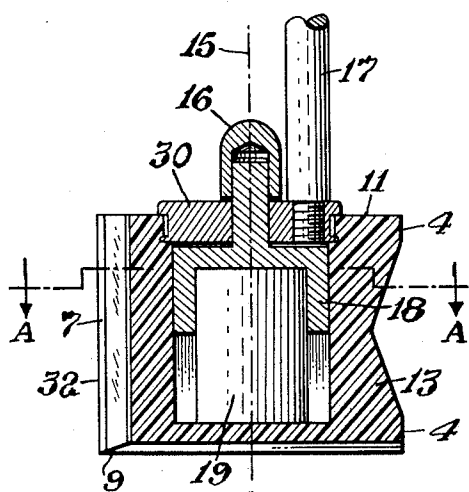
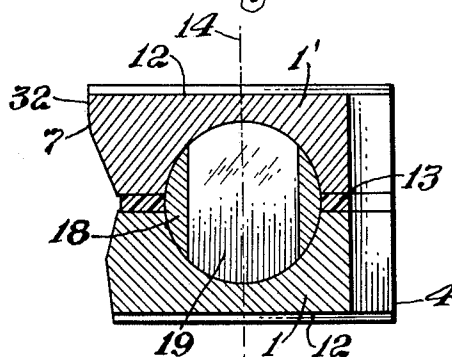


Fig. 3



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Fig. 4

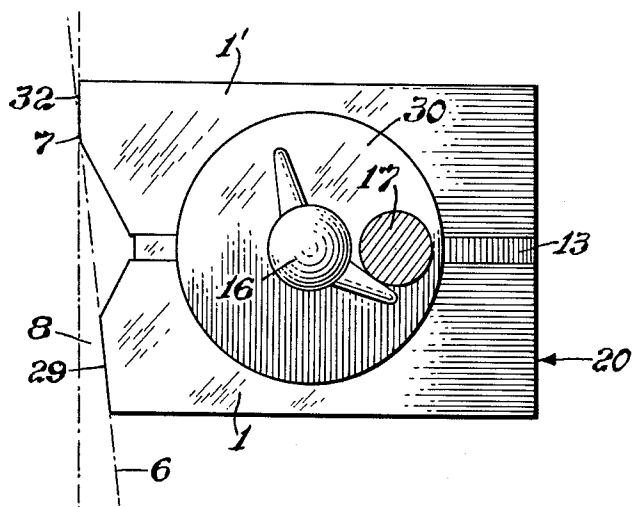
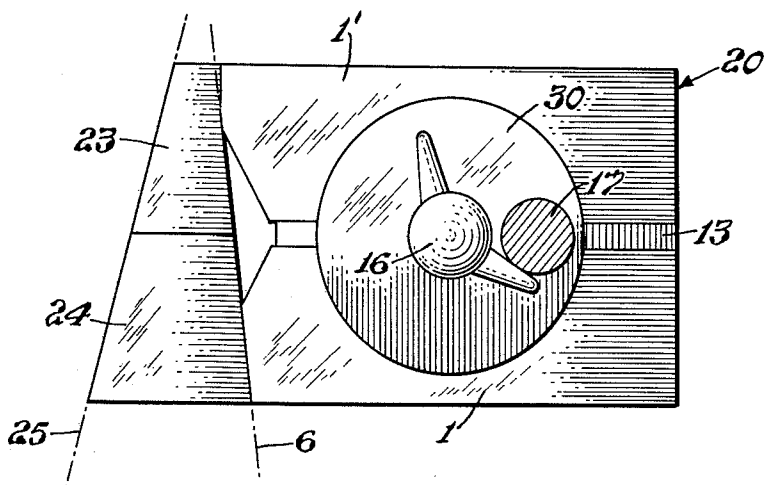


Fig. 5



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Fig. 6

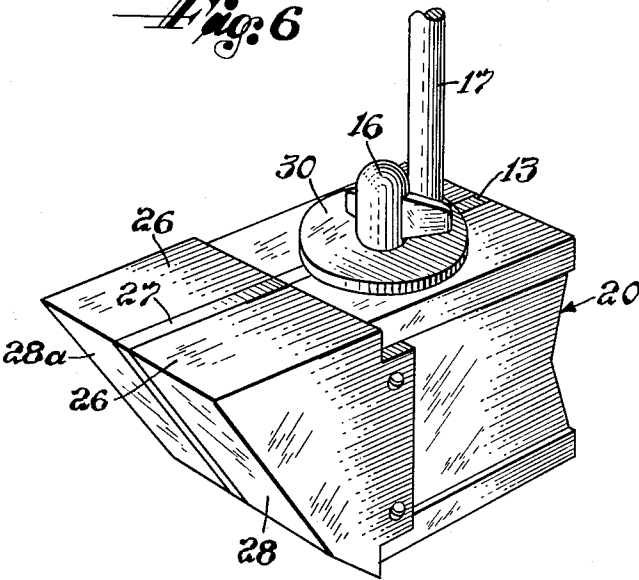
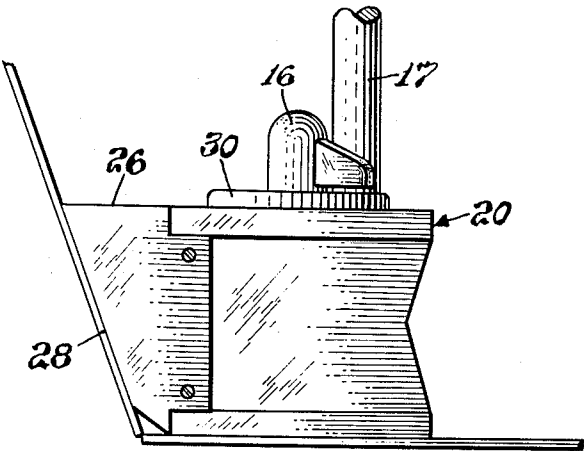


Fig. 7



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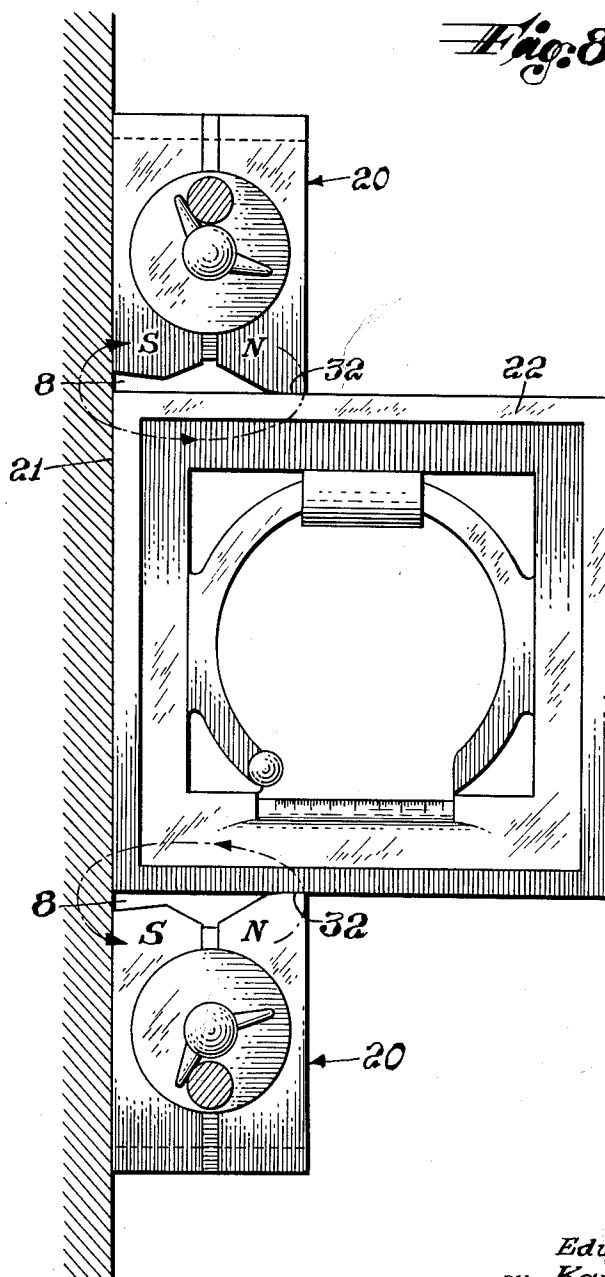
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MULTIPURPOSE MAGNETIC HOLDER WITH PERMANENT MAGNET

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Fig. 8



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MULTIPURPOSE MAGNETIC HOLDER WITH PERMANENT MAGNET

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13 Claims. (Cl. 317—159)

The invention relates to magnetic work holders and particularly to a multipurpose magnetic work holder equipped with a permanent magnet.

The position of the magnet of this invention can be adjusted relative to a non-magnetic pole plate, and the magnet is so arranged with respect to this pole plate and to the body of the work holder that at least four substantially flat faces of the holder body may exert the full attraction force of the magnet. The faces of the holder body enable several objects of magnetic material to be simultaneously held with the full attraction force of the magnet and in differently inclined planes. The magnet is movable in the holder for adjusting the magnetic flux so that the flux either traverses the fastened object or objects, or is contained within the holder body. This movement of the magnet is actuated by a suitably shaped and arranged handle.

The magnetic holder according to the invention has great versatility in service and the known advantageous features of hitherto made magnetic holders, while avoiding certain drawbacks of the known devices as will become apparent presently.

The magnetic work holders according to this invention have a non-magnetic pole plate located in the median plane of the holder body. Its position with respect to the magnetic axis of the magnet enables the front and the rear faces of the holder to attract flat as well as cylindrical objects. The bottom face may also be used for fastening flat or cylindrical objects and the top face for the fastening of flat objects. This is achieved by arranging the axis of rotation of the magnet parallel to the axis of a holder rod, and by placing the operating handle of the magnet on the top face of the holder where the holding rod which serves for supporting an indicator such as a dial gauge or the like, is also fastened, i.e. at the most accessible point of the magnetic work holder. This arrangement permits full utilization of all magnetically active surfaces of the holder and enables measurements to be made in various positions. The surface area available for fastening flat, cylindrical or profiled objects is much increased in comparison with hitherto used magnetic holders. The several fastening faces of the holder are provided with respective V-grooves which are angularly offset with respect to each other. It is an additional advantage of the magnetic holder according to the invention that it permits fastening several objects at right angles or obliquely relative to one another with the full force of the magnet by the use of adapters or extensions positioned on the fastening faces of the holder. Thus, it is possible to fasten one or more objects or measuring devices, such as a rule, a level, etc. on a common reference surface so that the operator may occupy himself with other measuring tasks or with the work on some machine. It is also possible to use the magnetic multipurpose work holder when welding together two flat, cylindrical, or profiled objects which are inclined relative to one another at any angle.

The accompanying drawings illustrate a preferred embodiment of the multipurpose magnetic holder of the present invention.

FIG. 1 is a perspective view of the holder.

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FIG. 2 shows the holder of FIG. 1 in side elevational section through the non-magnetic pole plate.

FIG. 3 is a plan view of the holder of FIG. 1 taken in section on the line A—A of FIG. 2.

FIG. 4 is a top view of the device of FIG. 1.

FIG. 5 shows the apparatus of FIG. 4 equipped with an angular adapter.

FIG. 6 is a perspective view of the holder of FIG. 1 fitted with an angular extension member.

FIG. 7 illustrates the use of an extension member for the welding of metal sheets.

FIG. 8 illustrates the use of two work holders of the invention for fastening an object to a vertical surface.

The basic work holder of the invention is of approximately cubic overall shape. It includes two magnetic body portions 1 and 1' and a non-magnetic spacing element or pole plate 13 interposed between the body portions 1 and extending in a median plane of the work holder parallel to two of the external faces. The body portions 1, 1' thus jointly form four of the faces of the work holder whereas the other two are formed by a single body portion. The pole plate 13 separates the body portions in the jointly formed faces.

The body portions 1, 1' and the pole plate 13 leave a cylindrical cavity within the work holder the axis 15 of which lies in the afore-mentioned median plane. One axial end of the cavity is closed by a non-magnetic cover plate 30. The plate 30 projects outward from one of the jointly formed faces of the work holder. This face will be referred to hereinafter as the "top face" for convenience of description, it being understood that the work holder may be oriented in space in any desired manner.

A shaft 18 which is rotatable about the axis 15 passes through the plate 30. The inner terminal portion of the shaft 18 in the work holder cavity is forked and holds a magnet 19 having the shape of a cylinder lacking two segments defined by parallel axial planes on opposite sides of the axis 15. The magnetic axis 14 of the magnet 19 is parallel to the last-mentioned planes and perpendicular to the axis of rotation 15. The outer terminal portion of the shaft 18 carries a two-armed handle 16 by means of which the magnet 19 may be rotated. A holding rod 17 is threadably mounted in the plate 30 and extends therefrom parallel to the axis 15.

When the magnet 19 is in the position seen from FIGS. 1 to 3, the magnetic flux produced by the magnet passes through all external faces of the holder with the exception of the two side faces 12 which are parallel to the non-magnetic pole plate 13. Magnetic objects may therefore be fastened to the front face 2 of the holder, to the rear face 4 and the bottom face 9 which are not seen in FIG. 1, and also to the top face portions 11 adjacent the handle 16 and rod 17. The rod may additionally carry an indicator such as a dial gauge or other measuring device. The rod 17 also acts as an abutment which limits the rotation of the handle 16 and serves as a support for the hand of the operator. This overcomes the torque of the magnet when fastening or removing an object and which would otherwise require the use of both hands. As can be seen from FIG. 2, the forked terminal shaft portion 18 holds the magnet only at one side, leaving the bottom face 9 of the holder unencumbered for fastening an object thereon.

The main fastening faces 2, 4, 9 are adapted to their task in a particular way. The front face 2 is partly beveled in an inclined vertical plane 6, in such a way that a vertically elongated narrow portion 32 of the face 2 on the body portion 1' adjacent one of the side faces 12 is perpendicular to both side faces 12, and an adjacent narrow portion 7 of the face 2 is inclined in the plane 6 relative to the face portion 32. The portion 29 of the face 2 on the body portion 1 adjacent the other side face 12 lies in

the same plane 6 as the face portion 7, and is therefore spaced by an air gap 8 (FIG. 4) from a plane defined by the face portion 29. The air gap 8 may be filled with non-magnetic material.

The afore-described configuration of the front face 2 enables the magnetic holder according to the invention to fasten more than one object with the full force of the magnet 19 to a supporting surface as shown in FIG. 8. Two work holders 20 of the afore-described type are each used primarily as a holder for an indicator (not shown). They are magnetically fastened to a vertical surface 21 of a machine tool while simultaneously securing a spirit level 22 to the surface 21 with the full force of their magnets. The magnetic flux of each holder issues from the north pole N of the magnet, traverses the fastening face portion 32 and the level 22 without being able to return directly to the south pole S through the air gap 8. It is compelled to traverse also the supporting surface 21 and returns therefrom to the south pole S as indicated by the arrows. Because of this arrangement, the operator can fully apply himself to the adjustment of instruments, to the alignment and the operation of the machine, to the preparation of records etc. He is able to readily fasten additional devices to the work holders, or to substitute them for previously attached devices.

FIG. 5 indicates how to enlarge the air gap 8 by means of an angular adapter 23, 24 superimposed on the face 2. The adapter consists of a magnetic part 23 and a non-magnetic part 24. The front face 25 of the angular adapter 23, 24 may form any angle with the plane 6 of the beveled front face of the holder, and a magnetic holder according to the invention or several holders when equipped with such adapters may be used for welding together sheets, tubes or rods which are inclined relative to one another at oblique angles while these objects are secured by the full magnetic flux of the holders. It is also possible to apply an angular extension member to the magnetic multipurpose holder 20 as shown in FIG. 6, the member consisting of two parts 26 of magnetic material and a spacer plate 27 of non-magnetic material. Faces 28 or 28a incline at the required angle on the angular member permit fastening two or more objects under the full magnetic flux.

The fastening faces 2, 4, 9 of the work holder have pairs of mutually inclined face portions 3, 5, 10. Each pair defines a groove of V-shaped cross section in the respective fastening face and permits the fastening of cylindrical or profiled objects. It will be understood that the front faces of the angular adapter 23, 24 and of the extension member 26, 27 may be provided with similar grooves.

When the magnetic multipurpose work holder 20 is placed with one of its faces 2, 4, or 9 on a flat, cylindrical or profiled surface made of magnetic material, and the handle 16 is in the position shown in FIGS. 1 to 3, the magnet 19 is in such a position that the magnetic flux traverses the object or objects on the fastening faces of the holder. When the magnet 19 is turned through a right angle from the position illustrated, the magnetic flux forms a magnetic circuit inside the body of the work holder. The mutual attraction of the fastened objects is energized by the full force of the magnet 19, and this force is made ineffective by turned handle 16.

What we claim is:

1. A magnetic work holder comprising two magnetic body portions; non-magnetic spacing means interposed between said body portions, said portions jointly defining a cavity in said holder and a plurality of substantially flat work holding faces on said holder, said faces being angularly offset relative to each other; a permanent magnet in said cavity, said magnet being rotatable about an axis passing through one of said faces and having two

magnet poles radially spaced from said axis in opposite directions.

2. A work holder as set forth in claim 1, wherein each of said work holding faces is offset relative to another one of said faces at substantially right angles.

3. A work holder as set forth in claim 1, further comprising rod means secured to one of said body portions and extending from one of said faces.

4. A work holder as set forth in claim 3, further comprising a shaft having two terminal portions and rotatable about said axis, said magnet being mounted on one of said terminal portions in said cavity, the other terminal portion extending outward of said cavity through said one face.

5. A work holder as set forth in claim 4, said shaft being rotatably mounted on said body portions and constituting the only mechanical connection between said magnet and said body portions.

6. A work holder as set forth in claim 1, further comprising a shaft having two terminal portions and rotatable about said axis, said magnet being mounted on one of said terminal portions in said cavity, the other terminal portion extending outward of said cavity through one of said faces.

7. A work holder as set forth in claim 6, further comprising actuating means on said other terminal portion for rotating said magnet in said cavity.

8. A work holder as set forth in claim 1, one of said faces being formed with an elongated groove of substantially V-shaped cross section.

9. A work holder as set forth in claim 1, wherein said plurality of jointly defined faces includes three faces, each of said three faces being formed with an elongated groove of substantially V-shaped cross section, the respective directions of elongation of said grooves being substantially perpendicular to each other.

10. A work holder as set forth in claim 1, wherein said plurality of jointly defined faces includes two adjacent faces, respective portions of said two faces define two planes substantially perpendicular to each other, and another portion of one of said two faces defines a plane obliquely inclined relative to said two perpendicular planes.

11. A work holder as set forth in claim 10, wherein said portions of said one face are respectively formed by said two magnetic body portions.

12. A work holder as set forth in claim 1, further comprising an adapter member superposed on one of said jointly defined work holding faces, said adapter member having a magnetic portion and a non-magnetic portion, said adapter portions being respectively superposed on said two body portions in said one work holding face.

13. A work holder as set forth in claim 1, further comprising an extension member superposed on one of said jointly defined work holding faces, said extension member having two magnetic portions and non-magnetic spacing means interposed between said magnetic extension member portions, the two magnetic portions and the spacing means of said extension member being respectively superposed on said two magnetic body portions in said one face.

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