Feb. 10, 1948. C. D. BRIGGS 2,435,735

MAGNETIC CHUCK

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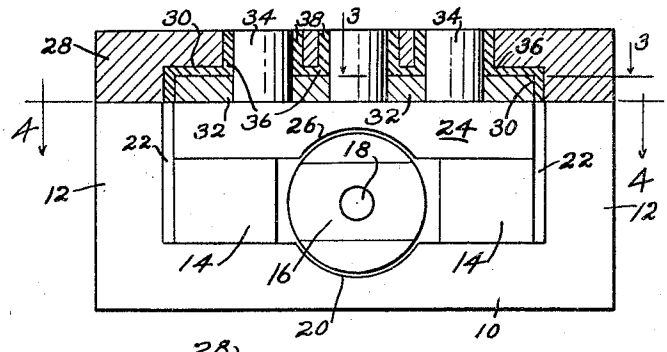


Fig. 1

Fig. 2

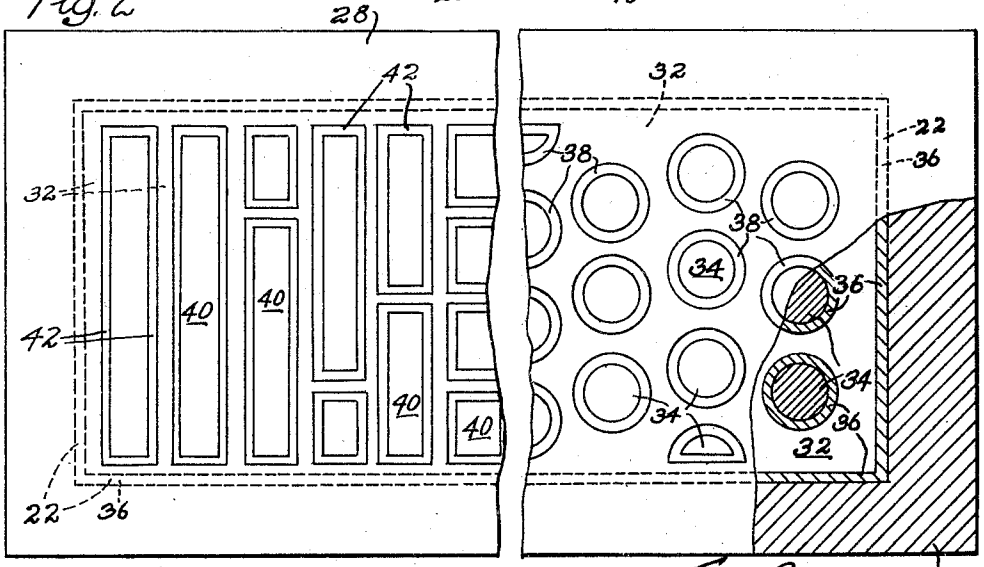


Fig. 3

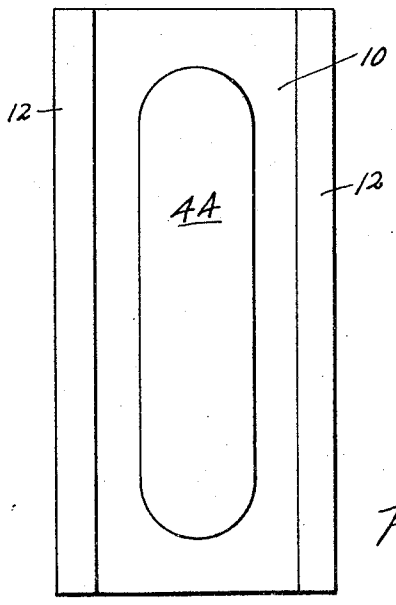


Fig. 5

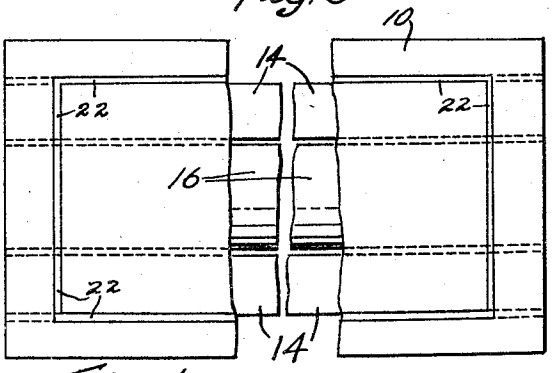


Fig. 4

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MAGNETIC CHUCK

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4 Claims. (Cl. 175—367)

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This invention relates to magnetic chucks whether electric or permanent magnetic and to separate top plates in combination therewith.

Objects of the invention include the provision of a chuck body having contained therein a source of magnetic flux and designed to provide a surface comprising two soft iron members magnetically spaced along predetermined lines for the purpose of supporting and magnetically holding separate, removable, and interchangeable top plates, said top plates each comprising a pair of soft iron members magnetically spaced in conformance with the magnetic separation or gap appearing in the above mentioned surface and adapted to be aligned therewith for cooperation with the magnetic flux source for the purpose of arranging the lines of flux to provide pluralities of work holding means, whereby the chuck body may be used with various top plates of different pole patterns to hold many varied work pieces.

Further objects of the invention include the provision of a generally U-shaped soft iron box-like frame, containing a source of magnetic flux, the space between the free ends of the U being closed by a solid soft iron plate magnetically spaced from said arms, the top surface of said plate being in line with the free ends of the arms; this device forming a source of flux which is capable of carrying interchangeable top plates of varied configuration as to the pole pieces, said top plates being easily separable therefrom.

Other objects and advantages of the invention will be hereinafter described.

In the drawings,

Fig. 1 is a view in end elevation of one form of the invention, parts being in section.

Fig. 2 is a partial top plan view of one form of top plate showing various pole patterns.

Fig. 3 is a view similar to Fig. 2 showing different pole patterns, parts being in section.

Fig. 4 is a top plan view of the chuck body with parts broken away and taken on line 4—4 of Fig. 1, and

Fig. 5 is a top plan view of the chuck body arranged for receiving an electric coil.

In Fig. 1 there is shown a generally U-shaped soft iron body having a bottom 10 and upstanding free ended legs 12. The bottom 10 and legs 12 may be cast integrally or may be built up in parts and secured together. A source of magnetic flux is placed within the chuck body and for the purpose of illustration in Fig. 1 this is shown as a pair of fixed permanent magnets in bar form as shown at 14. At central rotatable magnet 16 is provided to rotate on an axis at 18 and this magnet can be journaled in end

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plates not shown. The bottom 10 is formed with a circular depression 20 to accommodate the rotary magnet. Magnets 14 rest directly on the bottom 10 but are magnetically spaced from arms 12 by non-magnetic material as at 22.

A solid soft iron plate 24 is placed on magnets 14 for direct magnetic connection therewith and this plate is hollowed out at 26 similarly to the depression 20 and for the same purpose.

The construction as so far described provides a source of magnetic flux or "magnetic battery" in which the flux in "on position" of the control traverses the gap 22 which is rectangular in form in the surface of the chuck body as is shown in Fig. 4, and as it stands will hold any iron pieces crossing these gaps.

Various forms of top plates may be set directly on the top surface of the magnetic battery and one such top plate is disclosed in Fig. 1. This to plate comprises a plate 28 having a series of holes therethrough, these holes being in communication with an interior recess indicated at 30. The recess 30 conforms in general to the shape of plate 28 but appears at the lower side only thereof and has an area defined by the interior aspect of arms 12 of the chuck body.

A pole plate 32 having upstanding poles 34 designed to conform to the holes in plate 28 is set into recess 30 with the pole pieces 34 in the holes as clearly shown in Fig. 1. Non-magnetic material 36 is cast between plates 28 and 32 so as to effectively separate these two members. Pole pieces 34 may be separate as shown or integral with plate 24.

The flux from the magnets will travel through plate 24 into all of the poles 34, and work pieces spanning the gaps 36 occasioned by the non-magnetic material 36 will obviously be held to the top plate. The pole pattern of the top plate may be considerably varied as illustrated in Fig. 2 in which square and oblong pole pieces 40 are shown, these pole pieces being spaced from the plate 28 by gaps 42. However the construction in effect is the same as above described and it is to be understood that the pole pattern may assume any design desired as long as the gaps 36 coincide with gaps 22 at the mating lower surface of the top plate and upper surface of the chuck body.

In Fig. 5 I show a box-like frame similar to that shown in Fig. 1 but having a soft iron core 44 for the reception of an electric coil not shown. In this case plate 24 is used but without the depression 26 and the construction and operation of the device is otherwise the same as that above described.

It will be seen that the present invention dis-

closes a magnetic chuck or "battery" which may be either permanent or electric and which utilizes separable and interchangeable top plates having a variety of pole patterns, as long as the top plate, of whatever pole pattern, has a gap construction similar to that at **36** for alignment with the gap **22**; and thus articles of greatly differing sizes and shapes may be held to the chuck throughout the entire top surface thereof, eliminating the necessity of providing a different chuck for different work pieces, and decreasing the need for special chucks, special work holders, and auxiliary and supplemental top plates.

Having thus described my invention and the advantages thereof, I do not wish to be limited to the details herein disclosed, otherwise than as set forth in the claims, but what I claim is:

1. In a device of the class described, a soft iron housing forming a box-like structure and comprising a bottom member, connected side walls thereon, and a substantially solid top fitted between the side walls and magnetically insulated therefrom, a source of magnetic flux adapted to energize the bottom and side walls under one sign and the top under the opposite sign, and a separate removable and replaceable top plate comprising a pair of soft iron members magnetically insulated along a line conforming to the magnetic insulation between the solid top and side walls, one soft iron member being in the form of a rim adapted to coincide with the top edges of the side walls, and the other soft iron member being inside the rim and of a size and shape to coincide with the solid top, said soft iron members together presenting a work holding surface, said inside soft iron member comprising a plate having a lower element substantially entirely of soft iron in magnetic contact with said solid top, and said rim member having solid soft iron portions extending through and across the inside member, said portions being magnetically insulated from the inside member, and projections in the inside member extending to the top surface thereof between and insulated from said portions.

2. In a device of the class described, a soft iron housing forming a box-like structure and comprising a bottom member, connected side walls thereon, and a substantially solid top fitted between the side walls and magnetically insulated therefrom, a source of magnetic flux adapted to energize the bottom and side walls under one sign and the top under the opposite sign, and a separate removable and replaceable top plate comprising a pair of soft iron members magnetically insulated along a line conforming to the magnetic insulation between the solid top and side walls, one soft iron member being in the form of a rim adapted to coincide with the top edges of the side walls, and the other soft iron member being inside the rim and of a size and shape to coincide with the solid top, said soft iron members together presenting a work holding surface, said inside member comprising a lower soft iron element in magnetic contact with the solid top and spaced projections rising from the element, said projections being surrounded at their sides with magnetic insulation, said rim member having soft iron portions extending across and above the said lower element and filling the spaces between the projections, the latter having their top surfaces coplanar with the top surface of the rim member and the said portions thereof.

3. In a device of the class described, a soft iron housing forming a box-like structure and

comprising a bottom member, connected side walls thereon, and a substantially solid top fitted between the side walls and magnetically insulated therefrom, a source of magnetic flux adapted to energize the bottom and side walls under one sign and the top under the opposite sign, and a separate removable and replaceable top plate comprising a pair of soft iron members magnetically insulated along a line conforming to the magnetic insulation between the solid top and side walls, one soft iron member being in the form of a rim adapted to coincide with the top edges of the side walls, and the other soft iron member being inside the rim and of a size and shape to coincide with the solid top, said soft iron members together presenting a work holding surface, said inside member being located below the top surface of the rim member and being apertured, soft iron members in the apertures and projecting members thereabove into co-planar relation with the rim member, magnetic insulation about each projection and covering the inside member, said rim member extending across and above the inside member and forming therewith and the projections a flat parallel sided solid plate, the inside member only of which is in magnetic contact with the said solid top.

4. In a device of the class described, a soft iron housing forming a box-like structure and comprising a bottom member, connected side walls thereon, and a substantially solid top fitted between the side walls and magnetically insulated therefrom, a source of magnetic flux adapted to energize the bottom and side walls under one sign and the top under the opposite sign, and a separate removable and replaceable top plate comprising a pair of soft iron members magnetically insulated along a line conforming to the magnetic insulation between the solid top and side walls, one soft iron member being in the form of a rim adapted to coincide with the top edges of the side walls, and the other soft iron member being inside the rim and of a size and shape to coincide with the solid top, said soft iron members together presenting work holding surface, said rim member having a recessed bottom surface conforming in area to the solid top and extending completely across the same in spaced relation thereto due to the recess, the recessed area being apertured, the inside member being located in the recess and in magnetic contact with the solid top and projections on the inside member rising into the apertures and terminating in a co-planar relation with the rim member top surface, said rim member being magnetically insulated from the inside member and its projections.

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