June 11, 1946. F. SHEPPARD 2,401,887

MAGNETIC CHUCK ATTACHMENT PLATE

Filed Aug. 10, 1944

Fig. 1

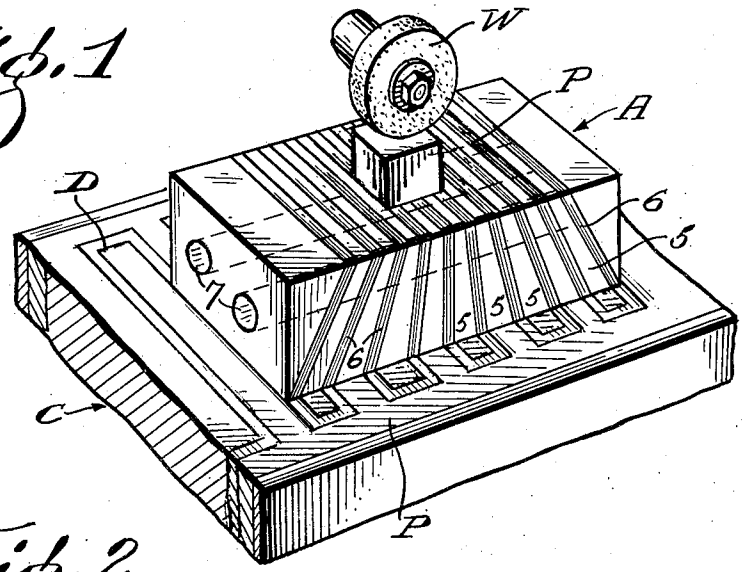


Fig. 2

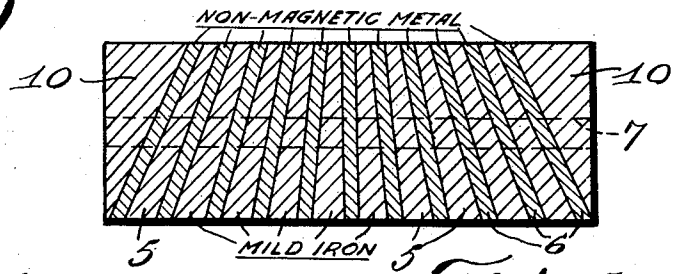


Fig. 3

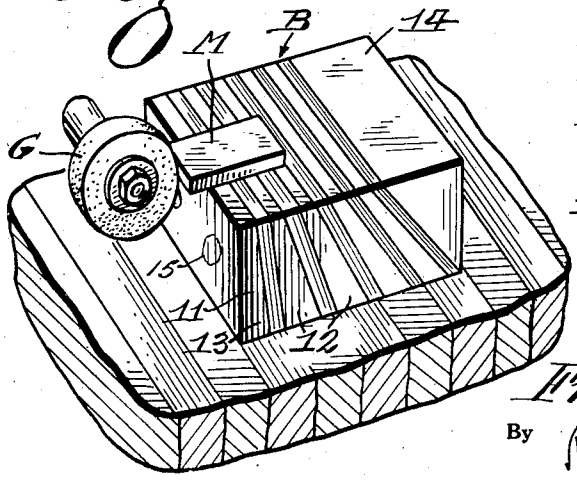
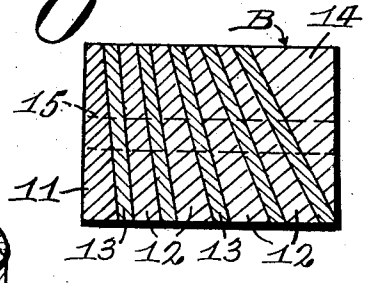


Fig. 4



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MAGNETIC CHUCK ATTACHMENT PLATE

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5 Claims. (Cl. 175—367)

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The present invention relates to magnetic chucks and, more particularly, an attachment therefor adapted to hold very small parts to be machined.

Magnetic chucks are well-known devices adapted to hold, by magnetism, ferrous and other magnetic metallic parts for machining and other purposes. Said chucks generally consist of spaced poles, oppositely magnetized by means of an inner electric coil, and the upper surface of which is perfectly flat and smooth.

Inasmuch as the poles and polar gaps are relatively large in said chucks, for reasons of electrical design, they are not very well adapted to hold metallic pieces smaller than the space between said poles.

The present invention has been conceived to avoid the disadvantage noted above, in a simple device adapting an average chuck to the use of small parts.

The main object of the invention, therefore, resides in the provision of means for rendering a magnetic chuck operative to retain small parts in an efficient manner.

Another object of the invention is the provision of means of the character noted, which means are simple, inexpensive and operable by anyone.

A further object contemplates means of the character described which are instantly adaptable to conventional chucks without adjustments or alterations thereto.

Other objects and advantages of the invention will become apparent, or be further pointed out, during the description to follow.

As an example, and for purposes of illustration, two forms of the invention are shown in the annexed drawing wherein:

Figure 1 is a perspective view of the preferred form of the invention if placed over a magnetic chuck,

Figure 2 is a vertical longitudinal section through the device of the invention shown in Figure 1,

Figure 3 is a perspective view of a modified form of the invention, and

Figure 4 is a longitudinal vertical section through said modified form.

Referring to the drawing, wherein similar reference characters represent corresponding parts throughout, the letter C generally indicates a magnetic chuck of conventional design, said chuck having inter-leaved poles P of opposite polarity, said poles being energized, as usual, by an inner magnetic coil (not shown). As previously stated, the spacing of the poles is such as

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to preclude the possibility of holding small objects because, as is well known, the retaining power of the chuck is directly proportional to the number of pairs of opposed polarity pole bridged by the object to be retained.

Consequently, in order to concentrate the magnetic flux emanating from the pole P into a more concentrated magnetic field, the device of the invention has been conceived, which device is indicated generally by the letter A.

The said device is in the form of a composite plate adapted to be used directly on the face of a magnetic chuck, as shown in Figure 1.

Said plate A consists essentially of a number of ferrous metal tapered segments **5**, separated by non-magnetic metal strips **6**, the said strips and segments being soldered together, bolted or, as shown, retained together by means of dowels **7** of non-magnetic metal and press-fitted longitudinally on the mass constituting the plate A.

As shown to advantage in Figures 1 and 2, the segments and strips are so disposed that they converge toward a common center or focal point which is theoretically disposed above the plate. The purpose of this arrangement is to space the segments, by means of the strips, so that said segments have a lower base approximately of a width corresponding substantially to the physical dimensions of the usual magnetic chuck with which it is desired to be associated. Furthermore, the tapered formation permits the said segments to be closer together at the top, whereby the magnetic field, or flux, conveyed from the poles P through the segments **5**, appears on top of the plate A as a concentrated magnetic field better adapted to hold small objects which, due to the close proximity of the poles, can bridge a number thereof for better and more efficient holding facilities.

Obviously, after the plate has been roughly assembled, the upper and lower surfaces thereof are perfectly levelled and rendered parallel. The flux is completed by the addition of end triangular pieces **10** adapted to act as retaining members for the dowels **7** or other means used for joining the elements of the plate in place.

From the foregoing description, and with the aid of Figure 1, it will be obvious that the plate A, disposed as shown, permits the small part P engaged by the grinding wheel G to bridge, in effect, at least five of the poles of the magnetic chuck C. Obviously, without the intermediary of said plate A, the physical dimensions of P would be such as to hardly bridge more than two poles

of the chuck C with correspondingly reduced holding power.

A modified form of the invention is shown in Figure 3, which form is very substantially the same as that shown in Figure 1, with the exception that one-half only of plate A is actually used. More specifically, the modified plate B embodies a central segment 11 the outer surface of which is perfectly perpendicular to the base of the plate and has to the right of said segment a number of similar segments 12 spaced by the strips 13 as previously disclosed. In this form also, one end piece 14 only is provided which may act as a slot to which the retaining members 15 are secured in any suitable manner.

The specific purpose of the modified form is to hold a small metallic part M on the very edge of the plate B so that the grinding wheel G may have access to the side edges of said part M for specific purposes. A section of this modified form is shown in Figure 4 which, as a matter of fact, is substantially the preferred form of Figure 1 cut in half and with the central non-magnetic metal strips 6 removed.

The uses to which the device can be put are believed to be fairly obvious from the illustrations, it being necessary simply to place the plate over a magnetic flux in a manner such that the base of the segments corresponds as closely as possible with the poles of the chuck. Of course, it may occur, in certain cases, that the alignment is not perfect due to physical differences in size, but the great number of magnetic lines conveyed to the small parts by means of the segments is usually sufficient to hold the same in perfect position for machining, grinding or hand working.

In practice, the plate A should have a certain thickness for providing a mass sufficient to react to the strain imposed by the magnetic flux. The number of converging mild iron segments is sufficiently limited to avoid lengthening the magnetic path unduly, whereby the end segments are rendered less efficient. Besides, since the attachment of the invention is provided solely for retaining small parts, it is evident that its physical dimensions can be kept relatively small.

It must be understood that various changes as to the shape, size and arrangement of parts can be effectuated without departing from the spirit of the invention or the scope of the subjoined claims.

Having thus described my invention, I claim:

1. A device of the character described, comprising a plurality of spaced non-magnetic strips, said strips converging towards a common center point, and segmental magnetic members interposed between said strips, the assembly having top and bottom surfaces at right angles to the plane of the central magnetic strip.

2. As an attachment to magnetic chucks, a rectangular composite plate having bottom and top plane faces, triangular end pieces, a plurality of alternating magnetic and non-magnetic members disposed between said end pieces, said members converging to a common focal point above the top, and means between the end pieces for clamping said members.

3. A plate of the character described, comprising a plurality of alternate magnetic and non-magnetic members, the magnetic members tapering from the bottom to the top thereof, whereby a plate is obtained having narrow magnetic areas at the top and wide magnetic areas at the bottom.

4. An attachment of the character described, comprising magnetic and non-magnetic elements in juxtaposed alternative positions, and means for securing said elements in close contact, the said elements being arranged radially around a common theoretical center, with the non-magnetic elements of uniform thickness and the magnetic one tapering from the bottom to the top thereof.

5. As an article of manufacture, a magnetic chuck attachment comprising a plate of rectangular shape having top and bottom plane surfaces, said plate consisting of magnetic and non-magnetic elements inclined vertically towards the center of said plate, whereby the magnetic elements are narrower at the top than at the bottom for the purpose of holding small parts securely.

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