

L. W. DOWNES & R. C. PATTON.
 METHOD OF FORMING MAGNETIC CHUCKS.
 APPLICATION FILED SEPT. 12, 1916.

1,254,664.

Patented Jan. 29, 1918.
 2 SHEETS—SHEET 1.

Fig. 1

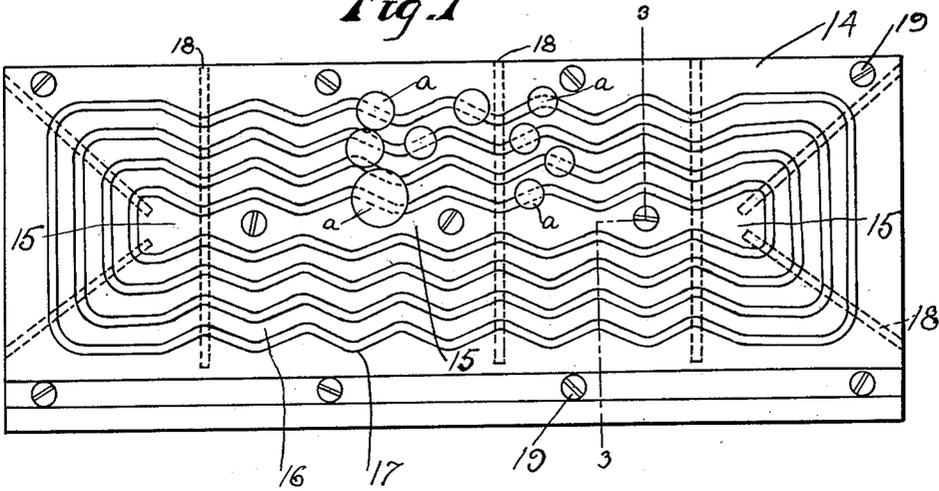


Fig. 2

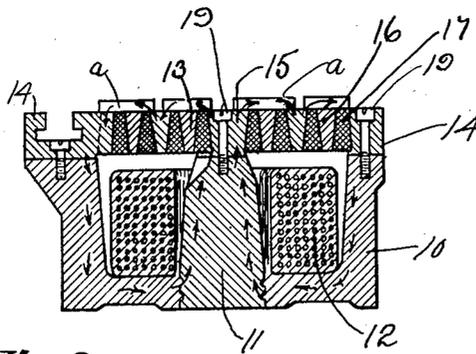
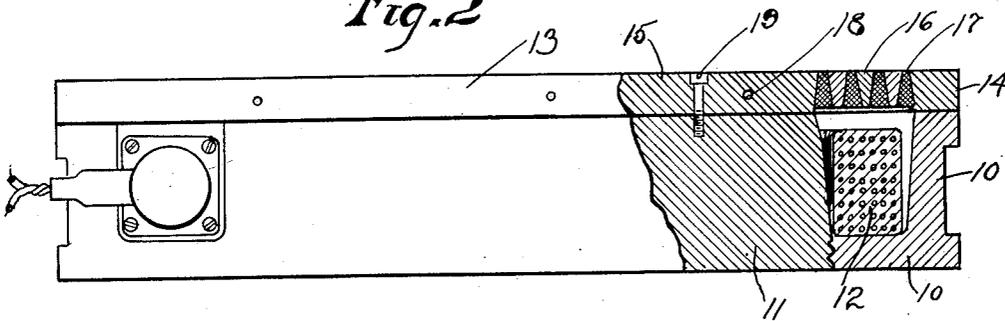


Fig. 3

Witnesses

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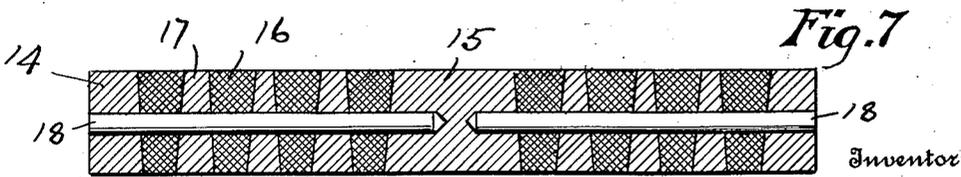
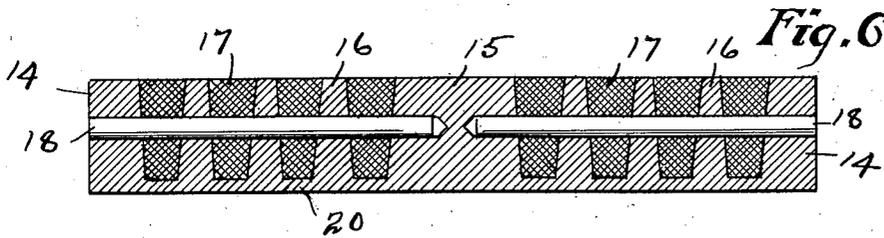
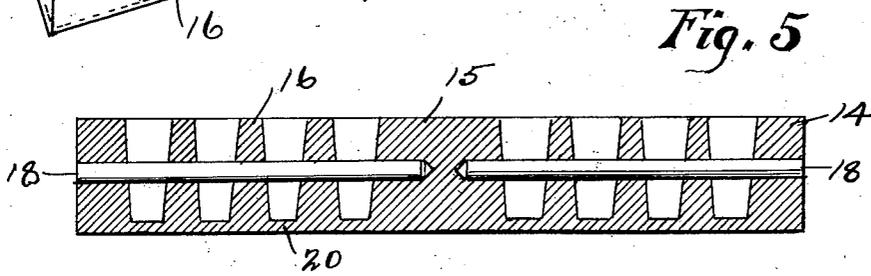
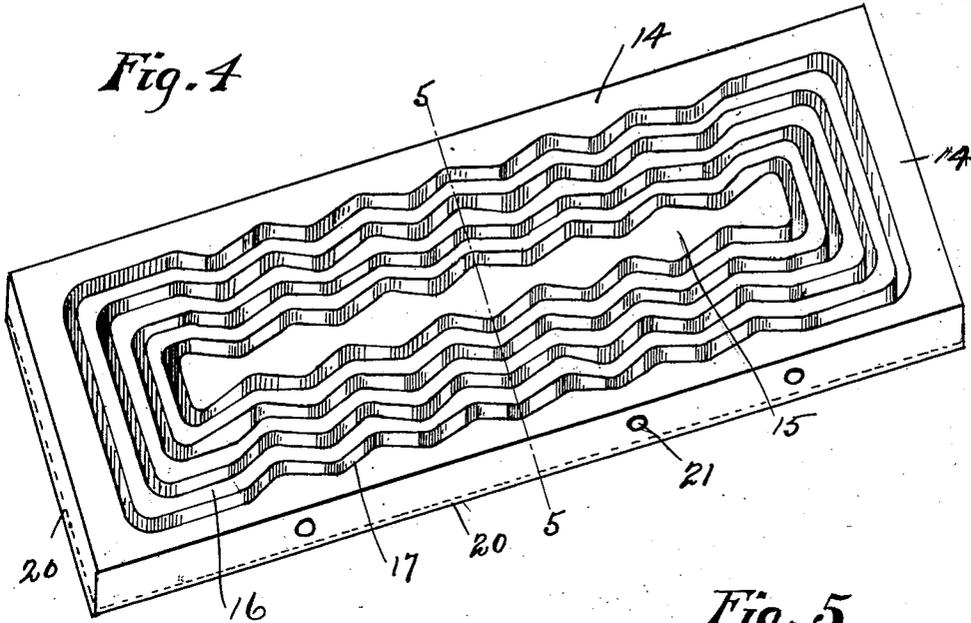
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UNITED STATES PATENT OFFICE.

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METHOD OF FORMING MAGNETIC CHUCKS.

1,254,664.

Specification of Letters Patent.

Patented Jan. 29, 1918.

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To all whom it may concern:

Be it known that we, LOUIS W. DOWNES and RALPH CLIFTON PATTON, citizens of the United States, and residents of the city of Providence, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Methods of Forming Magnetic Chucks, of which the following is a specification.

This invention relates to an improved method of forming magnetic chucks which are more particularly designed for holding a multiplicity of small pieces of work while being operated upon, but the chuck of our improved construction may be employed for holding work of any form.

The object of this invention is to facilitate the construction of such a chuck or more particularly the face plate portion of the chuck, which plate is provided with a plurality of alternate flux carrying members and non-magnetic gaps between its center pole and its outer flux carrying frame, whereby the undesirable leakage of magnetic flux present in all types of this class of chucks, which results in a loss of holding power, is reduced to the very minimum. This face plate is preferably formed separate and independent from the body portion of the chuck and is removably secured thereto.

With these and other objects in view, the invention consists of certain novel features of construction, as will be more fully described, and particularly pointed out in the appended claim.

In the accompanying drawings:

Figure 1— is a plan view showing the face of the chuck and the arrangement of the alternate flux carrying members and magnetic insulations separating the center pole from the outer frame or other pole.

Fig. 2— is a side elevation partly in section illustrating the construction whereby the face plate is formed separate and subsequently secured to the body of the chuck.

Fig. 3— is a sectional view on line 3—3 of Fig. 1.

Fig. 4— is a perspective view of the under side of the face plate showing the outer frame, the central core and the intermediate flux carrying members all cast together as a single unit, the connection between the mem-

bers being a thin web indicated in dotted lines on the lower edge thereof.

Fig. 5— is an enlarged sectional view taken on line 5—5 of Fig. 4 showing the grooves cast in the face plate and also showing the locking tie bars passing through the different members.

Fig. 6— is the same as Fig. 5 but showing the filler of non-magnetic material as having been poured into and filling the grooves about the bars, locking the whole together.

Fig. 7— shows the face plate with the bottom web removed in finishing, the plate being now ready to be positioned on the body portion of the chuck.

Referring to the drawings, 10 designates the body portion of the chuck constructed in the form of a trough-shaped receptacle and formed of magnetic flux carrying material such as cast iron or the like. In the middle portion of this body is formed a core 11 of different material such as wrought iron or the like, for the purpose of increasing the magnetic influence or action of the chuck upon the work. This central core is preferably connected to the base or the body portion by being cast therein.

A suitable magnetic wire coil 12 is carried in this frame 10 and is laid about this central core 11.

A feature of our improved chuck is in the construction of the face plate 13. This plate is preferably formed separate and independent of the body portion of the chuck, and comprises essentially an outer frame member 14, a central pole member 15 and a plurality of intermediate independent nesting magnetic flux conducting frames or rings 16 spaced apart and set one within and preferably parallel with the other, and the spaces between these frames are filled with non-magnetic material such as lead, Babbitt metal or other suitable substance.

A plurality of pins or bars 18 of low magnetic permeability such as nickel-steel, bronze or other suitable material extend through from the outer frame inward through all of the intermediate frames and insulations into the center pole member 15, whereby all of these members are rigidly locked together to prevent them from being forced out of position, even if a piece of heavy work should be accidentally dropped

upon the face of the chuck. After this face plate has been formed and finished on its top and bottom surfaces, it is secured to the body portion by screws 19 or other suitable means, and the center pole 15 then comes in contact with the core 11 of the body portion, and the outer frame 14 with the corresponding portion 10 of the body member.

By this construction, it will be noted that by the provision of a plurality of non-magnetic gaps arranged in series magnetically the undesirable flux leakage between the central pole and the outer flux carrying frame is reduced to the minimum. When the work, which is frequently in small pieces, is distributed about the face of the chuck in such a manner as to bridge the gaps, the magnetic flux travels upward through the core 11, central pole 15, across the work *a* as it bridges the gaps, into the different intermediate frames and then down through the outer wall of the body portion as best illustrated by the arrows in Fig. 3.

When work is placed on the chuck in such a way that a portion only of the entire number of gaps are bridged, then the total flux will traverse this work and the reluctance of the magnetic circuit is lessened in proportion to the number of non-magnetic gaps so bridged.

When no work is on the chuck face, the total amount of leakage must be across the several gaps in series.

It is found in practice in some instances, particularly where the intermediate frames are straight, that narrow straight bars of the same or less width than the frames placed upon the chuck to be operated upon, would not be held firmly, as the work must bridge one or more of the gaps to be affected by the magnetism.

In order to obviate this difficulty, we have formed these frames so that portions of them are sinuous or arranged to follow a zigzag course capable of operating more effectively upon the work of a greater variety of shapes.

Our present invention consists in the provision of a new and improved method of forming the chuck and more particularly the face plate of the chuck, which is that of constructing the same by casting the outer frame 14, the central pole 15 and the plurality of intermediate frames 16 all in one piece and connecting them at one edge by a thin web 20 all as illustrated in Figs. 4 to 7 inclusive. Such a casting when taken from the mold will be in reality a face plate having a number of deep grooves formed in one side thereof. The next step in the operation is to drill, cast or otherwise provide holes 21

through all of these members and insert the pins, bars or other members 18 therein, then a molten metal of non-magnetic material, which is employed for filling such magnetic gaps, is poured into these grooves around the pins which serve to securely lock the filling in position and all of the parts permanently together. The plate will then be machined on both sides to provide true surfaces. The connecting web which is merely for the sake of holding the parts in spaced apart relation while being cast and filled, will in the finishing operation be removed thereby separating the central pole 15 from the outer frame 14 by a plurality of alternate flux carrying frames and non-magnetic portions.

By this method of construction it will be seen that this face plate may be formed with its plurality of separated flux carrying members in a very simple, practical, effective and yet inexpensive manner.

We have described the various steps in our method of forming the chuck plate but their order of recitation need not necessarily be followed as in some cases the pins or lock bars may be inserted after the non-magnetic filling has been flowed into the grooves, if desired.

Having thus described one illustrative embodiment of our invention and the best mode known to us for carrying out our method, we desire it to be understood that although specific terms are employed they are used in a generic and descriptive sense and not for the purpose of limitation, the scope of the invention being limited only by the appended claim.

We claim:

An improved process of constructing a magnetic chuck member which consists in molding an outer frame and a central pole member and a plurality of intermediate flux carrying frames all as one integral piece by connecting them on one edge by an integral web thereby forming a series of deep grooves between said members, inserting a plurality of supporting tie bars of low magnetic permeability through all of said members, introducing a filling of non-magnetic material into said grooves causing it to flow about said bars and so lock itself and all the parts permanently in position, and subsequently removing said web to separate said members magnetically.

In testimony whereof we affix our signatures in presence of two witnesses.

LOUIS W. DOWNES.

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Witnesses:

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