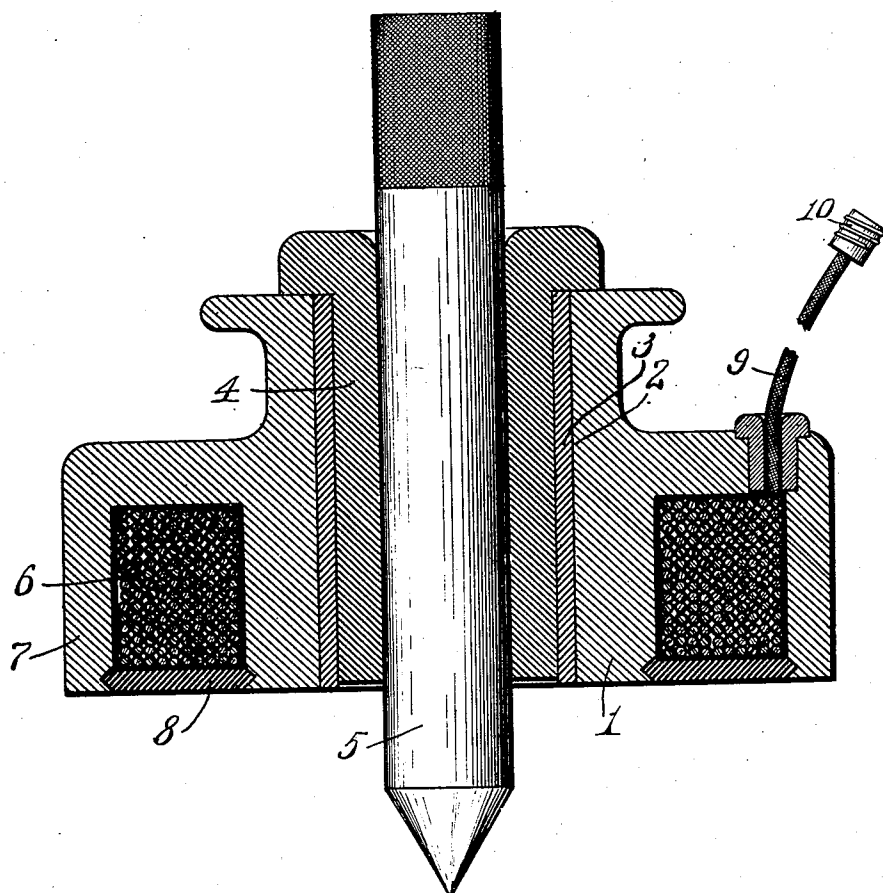


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A. L. DE LEEUW.
MAGNETIC DRILLING JIG.
(Application filed Mar. 24, 1902.)

(No Model.)



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MAGNETIC DRILLING-JIG.

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To all whom it may concern:

Be it known that I, ADOLPH L. DE LEEUW, a citizen of the United States, residing at Hamilton, Butler county, Ohio, have invented certain new and useful Improvements in Magnetic Drilling-Jigs, of which the following is a specification.

This invention relates to a magnetic jig designed for use by machinists in accurately guiding drills in positions indicated by a properly-located center-punch mark, the jig being magnetically secured to the face of the work and the drill being guided by a bushing therein.

15 The ordinary method for securing the accurate location of a drilled hole may be briefly described as follows: The center for the hole is marked with a deep center-punch mark to receive the point of the drill, and around it is scribed a concentric circle, generally accented by means of light prick-punch marks. The drilling is then started, and when the bits of the drill have fairly entered then the drill is removed and the work is inspected
25 to see if the countersink produced by the drill-bits is concentric with the scribed circle. Drills have a tendency to work over sidewise after being properly started, and consequently the initial work is quite apt to be eccentric. To correct this, a light groove is cut
30 down the proper side of the countersink and the test is repeated until finally the countersink is found to be concentric with the scribed circle, whereupon, carefully watching for recurring errors due to the side running of the drill, the drilling may be proceeded with. These corrective measure by grooving the countersink must be brought to full fruition before the drill enters the work the full depth
40 of its bits. The method is slow, expensive, and generally unsatisfactory. In the use of my improved jig the jig is properly centralized with reference to the central mark and then secured to the work in that position by magnetic attraction, the drilling then proceeding through a bushing known to be concentric with the desired center.

The invention will be readily understood from the following description, taken in connection with the accompanying drawing, which is a vertical diametrical section of a

magnetic drilling-jig exemplifying my invention.

In the drawing, 1 indicates a hollow magnet-core; 2, the circular bore of this core; 3, 55 a fixed bushing therein of non-magnetic material, as brass; 4, a bushing removably inserted within the bushing 3 and formed, preferably, of hardened material, the bore of this bushing 4 being the size of the hole to be
60 drilled; 5, a center plug fitting the bushing 4 and susceptible of movement therein by hand; 6, the energizing-coil surrounding the core 1; 7, a metallic jacket surrounding the core and having its upper portion carried inwardly to join the core 1 and form a roof over the coil, the lower face of the jacket 7 being even with the lower face of the core 1, the parts 1 and 7, in conjunction with the coil, forming an iron-clad magnet with lower concentric polar faces; 8, a retaining-ring disposed in the magnet structure below the coil and formed, preferably, of lead; 9, the flexible conductors leading outward from the coil, and 10 the terminals of these conductors, adapted for connection with the conductors
75 from which the supply of current is derived.

In using the device the center of the desired hole is first marked with a center-punch. The jig is then set over the work with the point 80 of the center 5 in the center-punch mark, thus locating the jig with the bore of its bushing concentric to the center-punch mark. The current is then turned on, thus energizing the magnet and fixing the jig firmly to the work. 85 The center 5 is then removed and the drill is fed through the jig, thus insuring that the drill will be guided concentric with the center-punch mark. The jig may, if desired, be continued in use until the drilling is done, 90 or it may be abandoned after the drill has entered the work beyond the depth of its bits.

The bore of the bushing 4 will be such as to suit the size of drill to be dealt with, and these bushings will of course be provided in
95 selective sizes. If there is but one of the centers 5 and that is of a size to suit but a given bush, then that given bush will require to be used in locating the jig. If the hole to be drilled is of a size different from that of the
100 bushing suiting the center 5, then after locating and fixing the jig the bushing employed

in connection with the center will require to be removed and a bushing substituted of a proper size to suit the drill, or, on the other hand, the particular bushing 4 may be considered or made part of the center 5, so that, practically considered, the center 5 can be used in the bushing 3 without any extra bushing, the large-bodied center being removed after the jig is located and fixed and a proper-sized bushing for drilling being then inserted in the jig.

In practical construction I find it advantageous to make the magnet structure of a single piece of magnetic metal accurately faced off below and centrally bored for the bushing 3 and concentrically grooved to receive the coil 6, which coil is completed and wrapped, &c., before being inserted in the groove, the lead ring 8 being then fixed in place to hold the coil in the groove. The terminals 10 of the flexible conductor may advantageously take the form of a double contact-plug, such as usually forms the base of an ordinary incandescent lamp, the conductor of the jig being thus adapted for convenient connection to an ordinary lamp-socket, the energizing-current being thus taken from the lighting-circuit.

The particular exemplification which has been described is adapted for general work of the class indicated; but the general principle of the invention will well lend itself to numerous modifications of construction, adapting it to special situations.

The present invention must not for an instant be confused with electromagnetic devices for holding work in drilling-machines or for holding portable drilling-machines to the work, for the tendency of unguided drill-points is to work erratically, as has been explained, quite regardless of whether the work be held in relation to the journal of the drill-spindle by means of electromagnets, clamps, bolts, or other devices.

My invention is applicable to cases where the drilling-machine and work are held in association by electromagnetic means, as well as in cases where the association is effected by other means.

I claim as my invention—

1. In a drilling-jig, the combination, substantially as set forth, of an electromagnet having a polar face adapted for contact with the surface of the work to be drilled and provided with a cylindrical guideway having its axis at right angles to the plane of said polar face and terminating at or near the plane of said polar face, and a concentric guiding-bushing separably disposed within said guideway and adapted to engage the body of the drill near the cutting-lips thereof.

2. In a drilling-jig, the combination, substantially as set forth, of an electromagnet having a polar face adapted for contact with the surface of the work to be drilled and provided with a cylindrical guideway having its axis at right angles to the plane of said polar

face and terminating at or near the plane of said polar face and adapted to engage the body of a drill, and a conically-pointed center plug concentrically disposed within said guideway and mounted for endwise movement therein and removable therefrom.

3. In a drilling-jig, the combination, substantially as set forth, of an electromagnet having a polar face adapted for contact with the surface of the work to be drilled and provided with a cylindrical guideway having its axis at right angles to the plane of said polar face and terminating at or near the plane of said polar face, a bushing of non-magnetic material fixed within said guideway, and a drill-guiding bushing separably disposed within said first-mentioned bushing and adapted to engage the body of the drill.

4. In a drilling-jig, the combination, substantially as set forth, of an electromagnet having a polar face adapted for contact with the surface of the work to be drilled and provided with a cylindrical guideway having its axis at right angles to the plane of said polar face and terminating at or near the plane of said polar face, a concentric bushing separably disposed within said guideway and adapted to engage the body of the drill, and a conically-pointed center plug separably disposed within said bushing.

5. In a drilling-jig, the combination, substantially as set forth, of an electromagnet having a polar face adapted for contact with the surface of the work to be drilled and provided with a cylindrical guideway having its axis at right angles to the plane of said polar face and terminating at or near the plane of said polar face, a bushing of non-magnetic material fixed within said guideway, a concentric bushing separably disposed within said first-mentioned bushing and adapted to engage the body of the drill, and a conically-pointed center plug separably disposed within said separable bushing.

6. In a drilling-jig, the combination, substantially as set forth, of a disk formed of magnetic material and having its lower face concentrically grooved and having a central bore, an energizing-coil disposed within said groove, and a center plug concentrically and separably disposed within said central bore.

7. In a drilling-jig, the combination, substantially as set forth, of a disk formed of magnetic material and having its lower face concentrically grooved and having a central bore, an energizing-coil disposed within said groove, a lining-bushing of non-magnetic material fixed in said central bore, a concentric bushing separably disposed within said lining-bushing, and a conically-pointed center plug disposed within said separable bushing.

8. In a drilling-jig, the combination, substantially as set forth, of a disk formed of magnetic material and having its lower face concentrically grooved and having a central bore, an energizing-coil disposed within said groove, a retaining-ring of non-magnetic ma-

terial secured to said disk and forming a floor to said concentric groove, a concentric bushing separably disposed within said bore, and a conically-pointed center plug concentrically and separably disposed within said bore.

9. In a drilling-jig, the combination, substantially as set forth, of a guide having a cylindrical drill-guiding bore whose inner end terminates in substantial juxtaposition with the face of the work when the jig is in position on the work whereby it is adapted to engage the body of the drill at the surface of the work to be operated upon, and an electromagnet connected therewith and adapted to adjustably fix said guide in relation to the work to be drilled.

10. The improved centering and drilling jig comprising a guideway transversely adjustable upon the face of the work to be drilled and adapted to engage the body of the drill to be employed and adapted to alternatively engage a center plug, an electromagnet connected with said guideway and serving to hold it to the face of the work after adjustment, and a cylindrically-bodied conically-pointed center plug adapted to fit said guideway and serve in positioning the guideway concentric with a center-mark engaged by the point of the center plug, combined substantially as and for the purpose set forth.

11. The improved centering and drilling jig comprising a jig-body having a guideway whose inner end terminates in substantial juxtaposition with the face of the work when the jig is in position on the work whereby it is adapted to fit the body of a drill and having a contact-surface at right angles thereto to engage the flat surface of the work to be drilled, and means for sticking said contact-surface to the flat surface of the work independent of the margins of the surface of the

work, substantially as and for the purpose set forth.

12. The improved device for aiding in the production of drilled holes concentric with a center-punch mark established in the surface of the work, said device consisting of a jig-body having a guideway whose inner end terminates in substantial juxtaposition with the face of the work when the jig is in position on the work whereby it is adapted to engage the body of the drill and be shifted over the surface of the work till it is concentric with the established center-punch mark, means for sticking said guideway to the surface of the work after it has been adjusted, and a concentric-pointed center plug slidably and removably mounted in the guideway of the jig and serving to position the jig while the point of the center plug is in the established center-punch mark, substantially as and for the purpose set forth.

13. The improved device for aiding in the production of drilled holes concentric with a center-punch mark established with the surface of the work, said device consisting of a cylindrical plug with a pointed end adapted to be set in said center-punch mark, a jig-body having a guideway in which said plug slidably and removably fits and having a contact-surface at right angles to the axis of said guideway, and means for sticking said contact-surface to the surface of the work while the guideway engages the body of the plug and the point of the plug engages the established center-punch mark, substantially as and for the purpose set forth.

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