No. 614,190. Patented Nov. 15, 1898.

O. S. WALKER.

MAGNETIC CHUCK.

(Application filed Mar. 11, 1897.)

(No Model.)

Fig. 1.

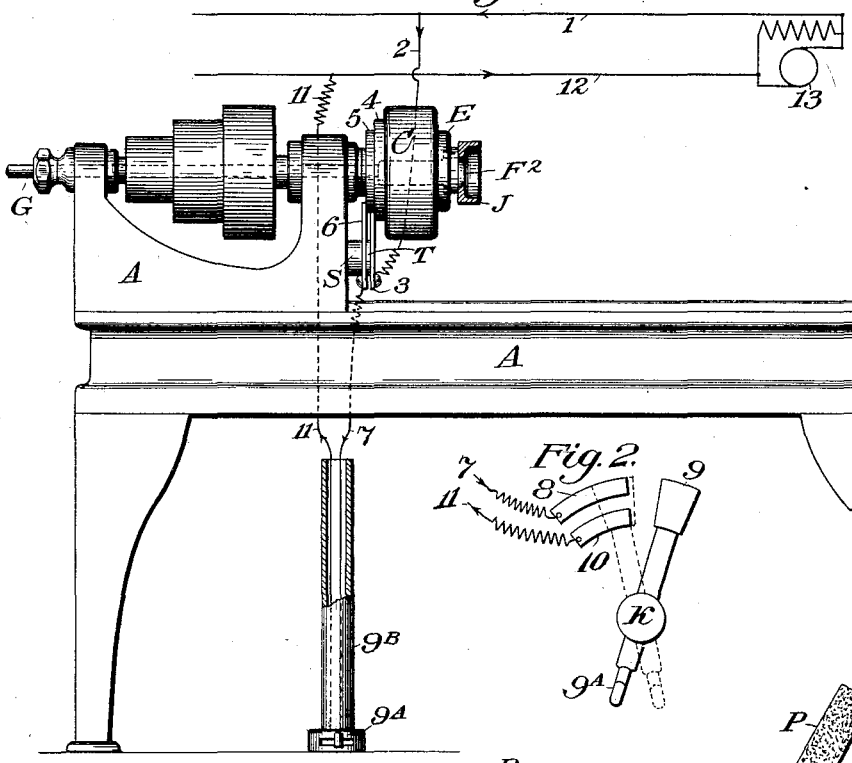


Fig. 2.

Fig. 3.

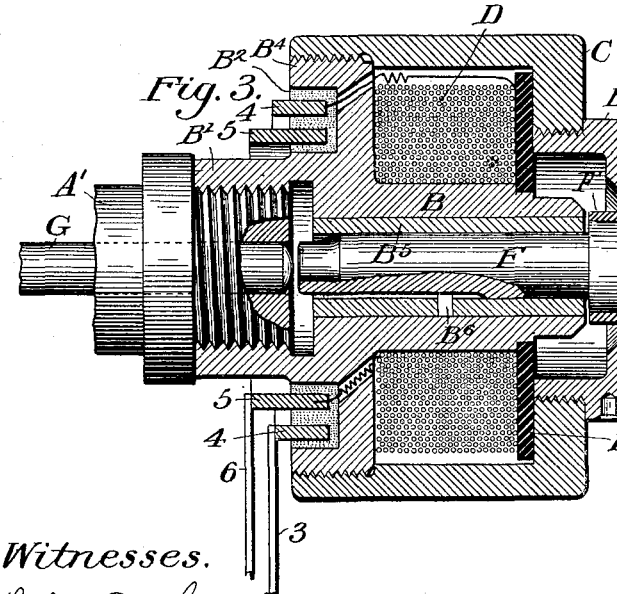
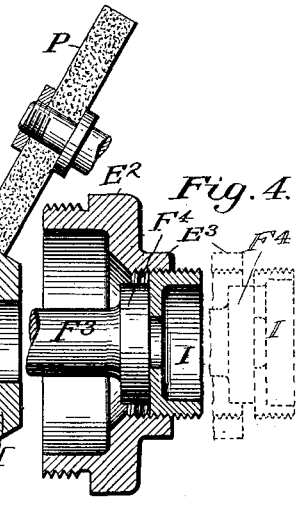


Fig. 4.



Witnesses.

Herbert Duckworth

B. A. Curtis

Inventor.

O. S. Walker

UNITED STATES PATENT OFFICE.

OAKLEY S. WALKER, OF WORCESTER, MASSACHUSETTS.

MAGNETIC CHUCK.

SPECIFICATION forming part of Letters Patent No. 614,190, dated November 15, 1898.

Application filed March 11, 1897. Serial No. 626,937. (No model.)

To all whom it may concern:

Be it known that I, OAKLEY S. WALKER, a citizen of the United States, residing in Worcester, in the county of Worcester and State of Massachusetts, have invented a new and useful Magnetic Chuck, of which the following is a specification.

My invention relates to revolving chucks, more particularly lathe-chucks, the object of the invention being to provide a more rapid and accurate method of centering and holding machine parts while being ground or otherwise manipulated; and to this end my invention consists of the new and novel features described hereinafter.

Referring to the accompanying drawings, like figures and letters of reference indicating like parts in each, Figure 1 is a side elevation of my magnetic chuck in place upon a lathe. Fig. 2 is a plan view of the operating-switch, and Fig. 3 a longitudinal section through the chuck and a portion of the lathe-spindle. Fig. 4 is a part section and part elevation showing one of the detachable plugs and one of the detachable bushings.

A represents an ordinary lathe fitted with hollow spindle A′ in the usual manner.

B is the central spool of the chuck, which is provided with a recessed and internally-threaded hub B′, which is fitted to the threaded end of the hollow lathe-spindle A′, as shown in Fig. 3.

The central spool B is provided near one end with a non-magnetic washer B^3, forming one head of the same, and near the other end is provided with a threaded flange B^4, forming the other head of the spool, upon which is mounted the electric coil D. The threaded flange B^4 is provided with an annular recess B^2 on its outer side, in which are cemented concentrically the insulated metallic rings 4 and 5, the cement being the insulating medium. The terminals of the coil D pass through holes in the flange B^4 and are electrically connected one to each of the metallic rings aforesaid. Brushes 3 and 6 lead the electric current to and from the coil, maintaining their contact on the rings when the chuck is in motion.

The internally-threaded magnetic casing C is screwed upon the threaded flange B^4 and forms a part of the magnetic circuit, and in its internally-threaded recess at the right-hand end is screwed the externally-threaded and internally-recessed bushing E, which is detachable at pleasure for the mounting of other bushings of various shapes, as E^2. (Shown in Fig. 4.) The end E′ of the detachable bushing E forms one pole of the magnet. (See Fig. 3.)

The central spool B is bushed at its center with the hardened-steel sleeve B^5, and projecting into the central hole of this sleeve is the pin-key B^6. Inserted into and closely fitting the central hole in the sleeve B^5 is the detachable centering-plug F, provided with a keyway fitting over the pin B^6 to prevent rotation of the plug, except in unison with the chuck. The plug F has longitudinal movement and is operated by the rod G, passing through the center of the lathe-spindle A′, as plainly shown. The right-hand end F^2 of the plug F is turned (preferably tapering) to enter the hole in a piece of work, as H, filling the hole at one point and centering the piece concentric with the chuck. The end F^2 of the plug F forms the other pole of the magnet, the piece of work H, Fig. 1, acting as an armature and adhering with great force to end E′ of the bushing E when the chuck-coil D is energized. A grinding-wheel P is shown in contact with the work H in Fig. 3.

To assist in conveying the magnetic lines of force from the center of the magnet to the piece of work H, a steel bushing F′ is mounted upon the end of plug F and is longitudinally adjustable on the same, and, abutting against the piece H, it thus conveys additional lines of force by means of the increased contact.

In Fig. 1 is shown a different piece of work J, it being held against the same bushing as in Fig. 3, and in Fig. 4 is shown a new bushing corresponding externally to E in Fig. 3, but provided with a taper-recess at the end, which is internally threaded for the reception of the piece of work I, externally threaded. In this case the work is centered by the detachable bushing E^2, while the office of the detachable plug F^3 is to prevent, by its strong adhesive power against its flange F^4, any lateral deviation of the work from truth, and at the same time prevent the same from becoming wedged too tightly in the tapered and

threaded recess in E^3. When it is desired to detach the piece I from the chuck, the latter is demagnetized, when the piece may be removed by the hand. When mounting the piece I, the plug F is pushed out by the rod G and the piece is first centered, as shown in the dotted lines, Fig. 4. Then the whole is pushed back by hand, and the screw-threads are easily entered in bushing E, and when in required position the chuck is energized and the piece I is held rigid, as above explained.

In the lower part of Fig. 1 and in Fig. 2 is shown a foot-power switch for operating the chuck. The electric wires 7 and 11 pass down through the switch-casing 9^b and connect to insulated metallic contacts 8 and 10 in the switch-base. The metallic switch-lever 9 is pivoted at K and moves horizontally over the contacts 8 and 10, electrically connecting the same when actuated by the projecting end 9^A of the switch. This lever is moved by an impulse given by the foot of the operator, the dotted lines, Fig. 2, showing the circuit complete across the contacts 8 and 10 and the end 9^A swung to the right.

It is evident that the chuck can be magnetized and demagnetized instantly at the will of the operator and without stopping the machine. The course of the electric current is as follows: When the switch is in the dotted position shown in Fig. 2, the electric current starting from the overhead main 1 passes through wire 2 to one of the brushes 3 to ring 4, thence through coil D to ring 5, brush 6, and wire 7 to contact 8, thence through switch-lever 9 to contact 10, wire 11 and 12, and generator 13 to starting-point.

The operation of the chuck is as follows: While the switch is in the position shown in Fig. 2 and the chuck is in motion, the centering-plug F is pushed out by the rod G, and the piece of work—as H, for instance—is placed upon the end of the same, and at the same time the switch 9 is swung to the dotted position shown in Fig. 2, completing the electric circuit, as previously described, and transforming the chuck into a strong electromagnet with poles at E′ and F^2. The piece H is now attracted against the pole E′, the centering-arbor F slipping back in the hardened sleeve B^5 until the magnetic circuit is complete. The piece is now held firmly against the pole E′ and the collar F′, which forms, with F^2, the other pole and is prevented from rotation by the pin B^6, as before described. The piece H can now be ground by the grinding-wheel P, suitably mounted for the purpose. To detach the piece, the grinding-wheel is first drawn back out of the way. The foot of the operator gives an impulse to the end 9^A of the switch, throwing it into the position shown in Fig. 2, demagnetizing the chuck. The left hand of the operator next partially expels the plug F and detaches the work by means of the rod G, when the piece H may be easily removed by the right hand of the operator without checking the motion of the chuck.

It is evident that metallic pieces of many other contours than the ones shown in the drawings could be held in my improved magnetic chuck by the addition of other detachable centering-plugs and bushings; also, that modifications of the parts shown could be made to hold metallic pieces magnetically. I therefore do not confine myself to the exact construction shown in the accompanying drawings; but

What I claim as new, and desire to secure by Letters Patent of the United States, is as follows:

1. In an electromagnetic revolving chuck for holding iron or steel pieces, the combination of an outer magnetic pole constructed to receive detachable bushings or pole-pieces of various sizes, an inner magnetic pole constructed to receive pole-pieces of various diameters and a series of detachable pole-pieces constructed to be mounted upon the said magnetic chuck for holding annular pieces of work of varying internal and external diameters as fully described.

2. In a magnetic chuck for holding iron or steel pieces, an electromagnet with an outer casing constructed to receive detachable bushings or pole-pieces, in combination with a hollow, central magnet-core which is constructed to receive longitudinally-adjustable centering-plugs thereby forming consequent pole-pieces for the purpose set forth.

3. In a magnetic chuck for holding iron or steel pieces, in combination with an electromagnet, means for centering the said iron or steel pieces of various sizes and contours, means for mounting various detachable pole-pieces of various sizes, and means for obtaining varying magnetic contact of pole-pieces with the work substantially as set forth.

4. In combination substantially as described, a magnet for holding iron or steel pieces, detachable pole-pieces for the outer casing and tapered detachable plugs adjustably fitted to the central magnet-core for the purpose set forth.

5. In a magnetic chuck for holding iron or steel pieces, the combination of an electromagnet for holding the pieces to be operated upon, detachable pole-pieces for the outer pole of the magnet, longitudinally-adjustable pole-pieces for the inner pole of the magnet and a foot-power electric switch, suitable for controlling the electric current for magnetizing and demagnetizing the chuck substantially as set forth.

OAKLEY S. WALKER.

Witnesses:
D. C. LAKIN,
HERBERT DUCKWORTH.