May 18, 1937. F. SCHENK 2,080,880

POLISHING MACHINE

Filed Dec. 10, 1935 2 Sheets-Sheet 1

FIG. 1

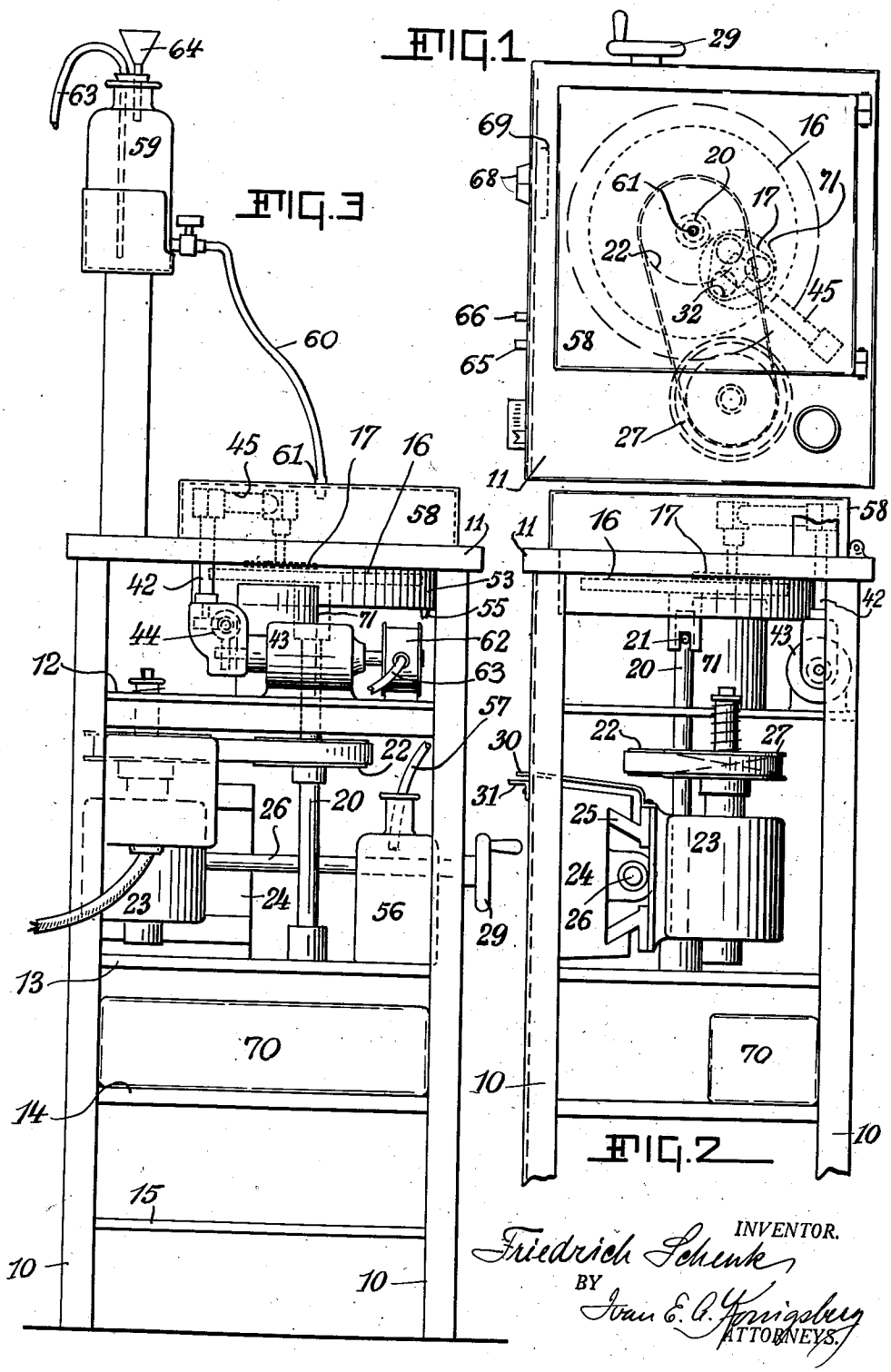

FIG. 3

FIG. 2

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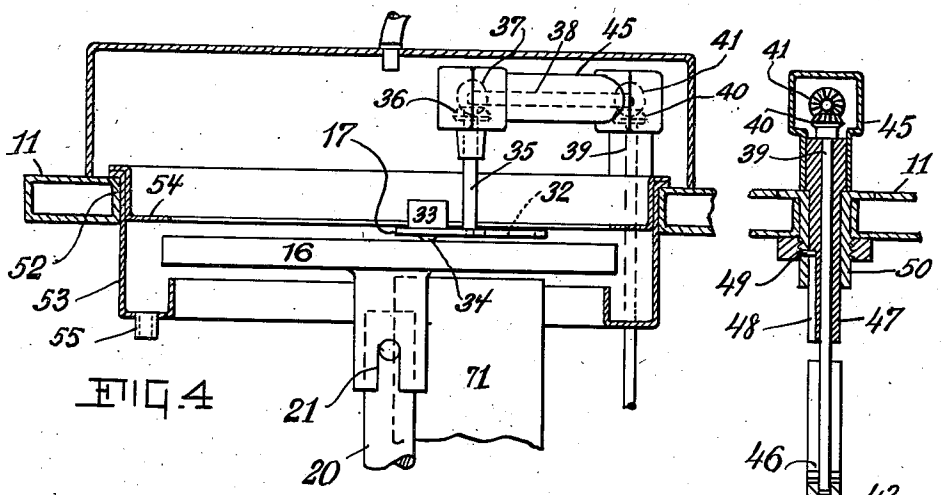

FIG. 4

FIG. 5

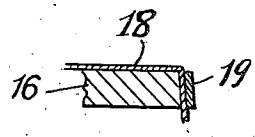

FIG. 6

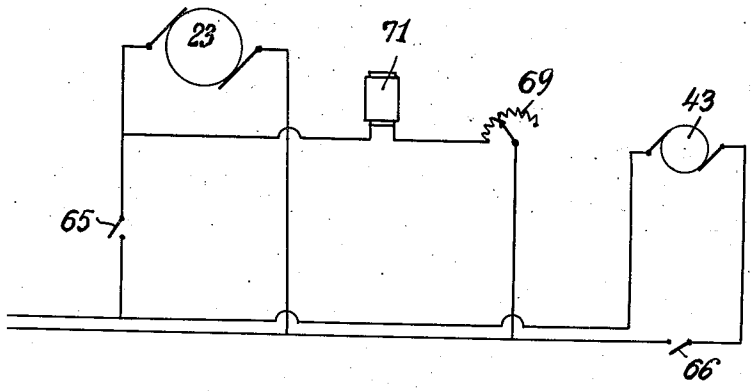

FIG. 7

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UNITED STATES PATENT OFFICE

2,080,880

POLISHING MACHINE

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Application December 10, 1935, Serial No. 53,709

5 Claims. (Cl. 51—131)

This invention relates to improvements in polishing machines for use in laboratories and like places for the purpose of polishing metal specimens for testing and research work. The object of the invention is to provide a generally improved polishing machine embodying electromagnetic means for holding the specimen against the polishing medium and including such novel features of arrangement and construction as will provide a selfcontained polishing unit. Other objects of the invention will appear as this specification proceeds. Accordingly the invention is embodied in a polishing machine arranged and constructed as hereinafter set forth and as illustrated in the accompanying drawings in which

Fig. 1 is a top view of the machine.

Fig. 2 is a side view with parts broken away.

Fig. 3 is a rear view.

Figs. 4, 5, and 6 are detail views of the polishing mechanism.

Fig. 7 is a wiring diagram.

One object of the invention is to provide a machine which shall be a complete polishing unit adapted to be moved about and operated by merely connecting it to an electric circuit. The machine therefore includes polishing elements and means for operating them so arranged that the polishing operation may be carried out automatically and very rapidly. The machine has a general framework consisting of uprights forming legs 10, 10 which carry a top 11 and shelves 12, 13, 14 and 15. The polishing mechanism comprises a polishing disk 16 and a work holder 17. The polishing disk is of iron and is covered with a fabric 18 removably held in place by a ring 19, Figure 6. The disk is removably carried by a main upright shaft 20 by means of a pin and slot connection as at 21. The shaft is suitably supported in the framework and carries a pulley 22 and is driven from a motor 23 which is part of a well known driving mechanism known as a varispeed motor mechanism. This mechanism includes a base 24 in which the motor is slidably operated by means such as indicated at 25. A speed changing shaft 26 is employed to slide the motor 23 towards and away from the disk shaft 20. A belt passes over the pulley 22 and to another pulley 27 driven by the motor 23. The mechanism is so arranged that when the motor is moved upon its base the speed of the pulley 27 is automatically changed. For the purposes of this specification it is sufficient to know that when the shaft 26 is turned by the operator by the handwheel 29 the speed of the main shaft 20 and pulley 22 is changed to suit the polishing operation. A pointer 30 is attached to the motor sliding means 25 and indicates the speed upon a scale 31.

The work holder 17 is in the form of a thin plate having openings 32 to receive specimen holders of the type used in laboratories and indicated in Figure 4 at 33 to hold a specimen 34. The work holder is screwed on to a work holder shaft 35 which carries a bevel gear 36 driven from another bevel gear 37 upon a horizontal shaft 38. The latter in turn is driven from an upright shaft 39 by means of bevel gears 40 and 41. The shaft 39 is slidably connected to another upright shaft 42 which is driven from a small motor 43 through a suitable reducing gear mechanism 44, Figure 3.

The work holder driving means are supported within a tubular casing 45 and means are provided for lifting the work holder upwards away from the polishing disk 16 shown in Figure 4 and swing it in over the table top into an inactive position when the polishing operation has been completed. As seen in Figure 5 the shaft 39 is in slidable driving connection at 46 with the shaft 42 and is supported within a bearing sleeve 47. The latter has a slot 48 which fits over a pin 49 in a fixed bushing 50 secured to the table top 11. In the position shown in Figure 5 it is clear that the two shafts 39 and 42 are in operative driving connection and consequently the work holder 17 is rotated by the driving connections described. However, when the polishing operation has been completed, the operator takes hold of the casing 45 and lifts the work holder away from the disk 16. The bearing sleeve 47 is secured to the casing 45 and is therefore also lifted sliding on the pin 49 until it is above said pin at which time the casing 45 is rotated and the work holder swung in over the table as will be understood. The two shafts 39 and 42 remain in driving connection because the vertical movement necessary to bring the sleeve to rest above the pin 49 is less than the movement required to disconnect the two shafts. The rotation of the work holder driving shaft 42 is stopped by opening the switch 66 in the electric circuit to the work holder motor 43. The reverse movement of course places the work holder in working position.

The table top 11 has a circular opening 52 through which the polishing disk is lowered into operative position upon the shaft 20. Before the disk is lowered there is placed in said opening a circular drain pan 53 and after the disk has been placed, a circular splash ring 54 is positioned within the opening 52. The splash pan has a drain opening 55 which drains into a vessel 56

through a rubber hose 57, Figure 3. The table carries a hinged cover 58 adapted to be closed down over the work holder in its operating position. The table also carries a bottle 59 for containing a suitable polishing liquid, for instance lavigated aluminia. The liquid drips down upon the polishing disk by way of a rubber hose 60 connected to an inlet 61 in the cover 58. The liquid is agitated by air being blown into the bottle from a small blower 62 driven by the motor 43. The air passes to the bottle through a rubber hose 63. Liquid is poured into the bottle 59 through a funnel 64. In Figure 1 the numerals 65 and 66 indicate switch levers and 68 the operating knob of a rheostat 69. These parts are therefore in the front of the machine. The shelves in the framework serve to support the several parts. Shelf 14 may support a transformer 70 if such is needed depending upon the local current. Shelf 15 is convenient for storage. 71 is an electromagnet supported on the shelf 12 in alinement with the work holder 17 when the latter is in operating position, Figure 1.

In operation the work holder 17 is moved from its normal inactive position and swung into its operative position above the polishing disk as shown in Figure 4, the specimens to be polished having first been placed in the openings 32. It will be noted that the work holder plate 17 is screwed into the shaft 35 so that it may be exchanged for work holders of other design. The bottle 59 has of course been filled with polishing liquid. The lid 58 is then closed and the outlet from the bottle opened. The operator then closes the switches 65 and 66 thereby starting the two motors and also closing the circuit through the magnet 71 which may be regulated by the rheostat 69, Figure 7. During the operation the specimens are drawn down against the polishing disk by the magnet 71 and the polishing is accomplished by the rotation of the disk 16 in one direction and the rotation of the work holder in the opposite direction in an obvious manner. The polishing liquid is being agitated by the air stream from the blower 62 and drops upon the fabric 18 and spreads by centrifugal action. The splash pan 53 and splash ring 54 catch the liquid between them as it is being thrown off from the disk 16. The operation is stopped from time to time to inspect the specimen. Also at the start or at any time during the operation the speed of the polishing disk may be adjusted by operating the hand wheel 29.

When the specimens have been polished they are removed and the machine is easily cleaned and put in order for the next operation because of the detachability of the work holder, the splash pan and ring of the polishing disk. The machine is highly efficient, self-contained and portable. It will further be understood that the invention is not limited to the precise form shown but that changes and modifications may be made within the scope of the appended claims without departing from the principle of the invention.

I claim:—

1. A polishing machine including a framework, a polishing disk supported therein, means for supplying polishing liquid to said disk, a vessel supported beneath the disk to receive polishing liquid thrown off of said disk, a splash ring above the disk, a work holder in operative relation to said disk, a motor for rotating the disk, a second motor for rotating the work holder and a blower operated from said second motor to agitate the said polishing liquid before it reaches the said disk.

2. A polishing machine including a framework, a table top thereon having an opening, a polishing disk, a main shaft for detachably supporting the disk within said opening, a work holder, a motor for rotating the same, driving connections between the motor and the work holder, supporting means enclosing said driving connections, and capable of being moved vertically and horizontally to place the work holder into and out of operative relation to the polishing disk without disconnecting the work holder from the said motor and a second motor for rotating the said main shaft.

3. A polishing machine comprising a framework, a table top thereon having an opening, a polishing disk, means for supporting the same within the said opening, a work holder, a hollow casing supporting said work holder in vertically movable and laterally swingable relation to the polishing disk, electromagnetic means for keeping the work in said work holder in frictional polishing relation to said disk, a vessel containing polishing liquid mounted above said table top, a cover for covering the said work holder and disk during the polishing operation, means attached to said cover and vessel for supplying polishing liquid to the polishing disk, means for draining the liquid thrown off from the disk during the polishing operation, means for agitating the polishing liquid in said vessel, a motor for rotating said polishing disk, a second motor and driving connections between the latter and the work holder contained within the said hollow casing.

4. A polishing machine comprising a framework, a table top thereon having an opening, a polishing disk, means for supporting the same within the said opening, a work holder, a hollow casing supporting said work holder in vertically movable and laterally swingable relation to the polishing disk, electromagnetic means for keeping the work in said work holder in frictional polishing relation to said disk, a vessel containing polishing liquid mounted above said table top, a cover for covering the said work holder and disk during the polishing operation, means attached to said cover and vessel for supplying polishing liquid to the polishing disk, means for draining the liquid thrown off from the disk during the polishing operation, means for agitating the polishing liquid in said vessel, a motor for rotating said polishing disk, means for supporting the motor in speed variable relation to the said disk, a handle for actuating the said motor supporting means, a speed indicator for said motor and a second motor for rotating the work holder and operating said agitating means.

5. The combination of a movable work holder, a polishing disk, an electromagnet supported underneath said disk in operative relation to the work holder, an electric motor for rotating the work holder, driving connections between the latter and the said motor, a swingably supported housing enclosing said driving connections for placing the work holder into and out of operative relation to the polishing disk and the electromagnet, a second motor for rotating the polishing disk, an electric circuit including the said two motors and the electromagnet, a switch in said circuit for closing the circuit through one of the motors and the electromagnet and another switch for closing the circuit through the other motor.

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