

July 7, 1931.

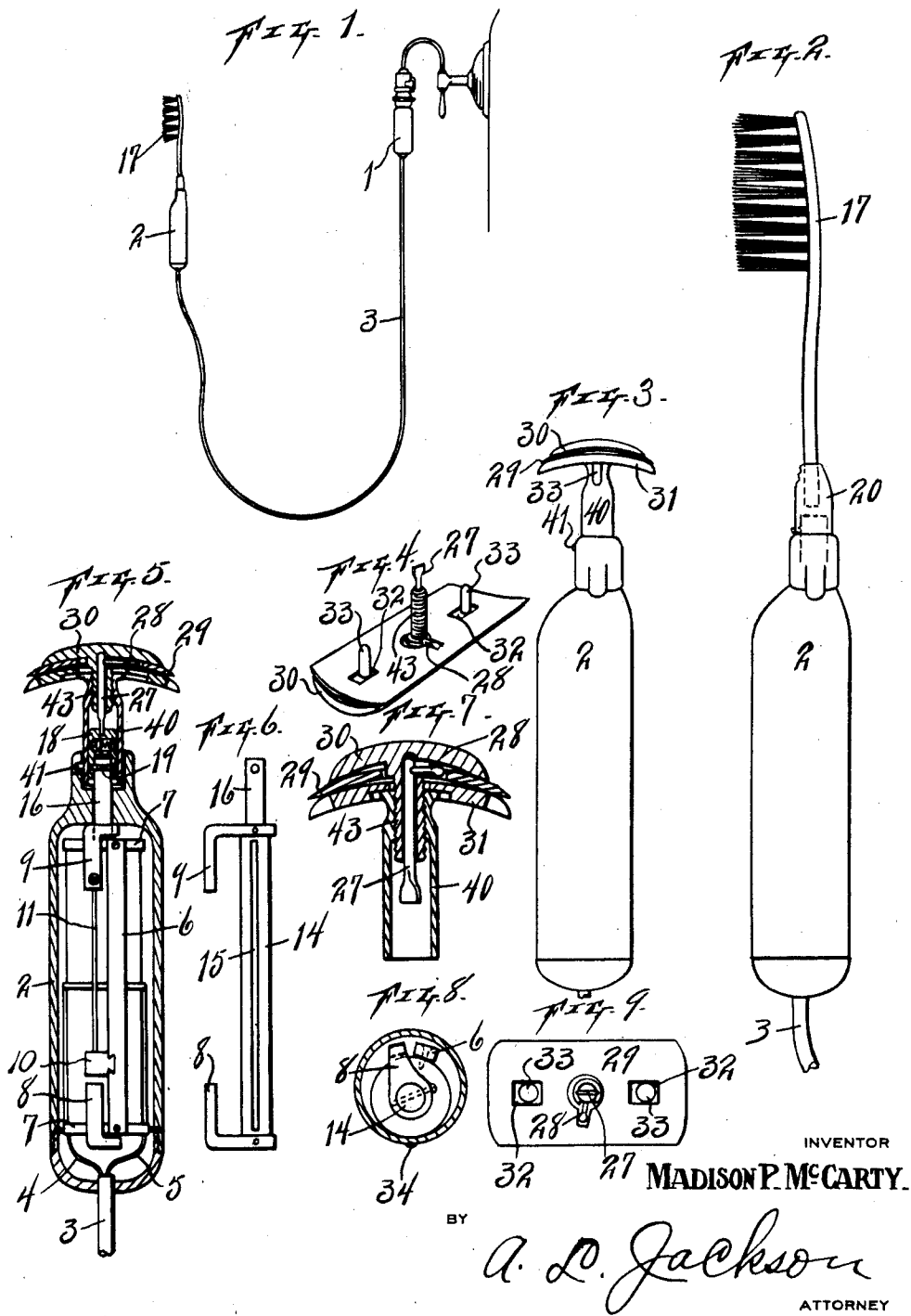
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ELECTROMAGNETIC OSCILLATOR

Filed July 23, 1929

2 Sheets-Sheet 1



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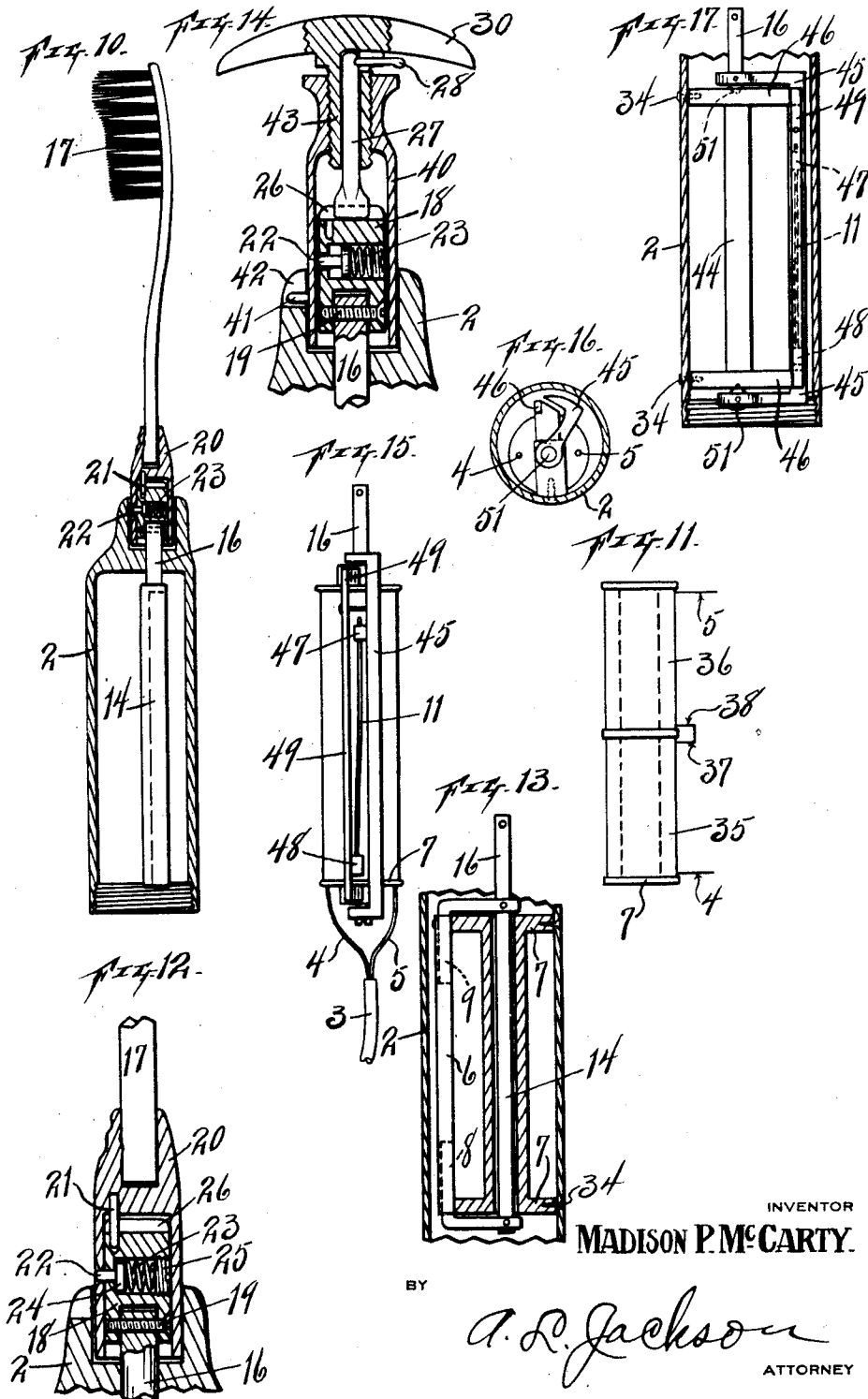
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ELECTROMAGNETIC OSCILLATOR

Application filed July 23, 1929. Serial No. 380,452.

This invention relates to electrically operated devices and it has particular reference to an electrically operated instrument, whose function is to provide a holder for instruments of a utilitarian nature, such as safety razors, files, tooth brushes and the like and the principal object of the invention resides in a complete and novel holder of the character specified, which, by means of magnetic force, produces an ingenious and exceptionally useful device in which the several instruments named are interchangeable.

Still another object of the invention resides in its adaptability for use as a tooth brush, safety razor or similar instruments, due to the provision of means through which is eliminated the possibility of subjecting the user thereof to electrical shocks.

Still another object of the invention resides in the provision of a device of the character specified, in which is embodied a new combination of elements, producing a novel movement in a very compact arrangement for transmitting, preferably oscillating movement to the various instruments which may be designed to be attached to and operated thereby.

With the foregoing objects as paramount, the invention has particular reference to its peculiar arrangement and operation of parts which will become manifest as the description proceeds, taken in connection with the accompanying drawings, wherein:—

Figure 1 is a view of the invention attached to a conventional electrical wall fixture.

Figure 2 is an elevational view of the invention, showing an accessory, in the form of a tooth brush, applied thereto.

Figure 3 is a similar view of the invention, with a safety razor as an accessory.

Figure 4 is a perspective view of the safety razor blade holder of the type suitable for application to the invention.

Figure 5 is an axial section of one form of the invention.

Figure 6 is a detail view of the core and pole pieces of the oscillator.

Figure 7 is a sectional view of the safety razor head, illustrating the manner in which

oscillatory movement is converted into reciprocative movement to move the blade longitudinally in the head.

Figure 8 is an end illustration of the electro-magnet, pole piece and armature.

Figure 9 is a view of a razor blade of the peculiar design adapted to the present invention, showing its reciprocating device.

Figure 10 is a sectional view of the casing of the invention, showing the specific manner in which an accessory is applied.

Figure 11 is an elevational view of an electro-magnet, forming part of the present invention and having a double winding.

Figure 12 is an enlarged view in fragmentary cross section of the securing means shown in Figure 10.

Figure 13 is a view in fragmentary cross-section of the casing, coil winding spool in relationship therewith and further showing a bearing for the core formed in said spool.

Figure 14 is an enlarged view in fragmentary section, showing the blade reciprocating mechanism, with the accessory in the form of a safety razor.

Figure 15 is a modified form of the armature and core.

Figure 16 is an end elevational view of the form of the invention shown in Figure 15, and

Figure 17 is a side elevational view taken at a one-fourth angle on Figure 15 and fragmentarily showing its casing.

Continuing more in detail, it may be briefly stated that the invention embodies a combination of elements so arranged as to be cooperative in transmitting oscillatory movement to a shaft, which shaft projects from the casing to receive any character of instrument designed to be operated by the invention. It is obvious that the movement is not vibratory but is perceptibly oscillatory and to such a degree that an instrument applied thereto will have a definite movement, either oscillatory or reciprocative, depending upon the provision of means whereby to convert one movement to the other, but such means would not necessarily be a part of the present invention although it is necessary to complete the major purpose of the invention, that of impart-

ing to a safety razor blade the prerequisite shuttle or shuttle like movement or reciprocation.

Accordingly, 1 designates a suitable transformer of conventional type which is so designed that it may be threaded into any convenient alternating current outlet in the manner shown in Figure 1. The purpose of this transformer is to reduce the house current, which is usually 110 V. to a desirable low voltage of approximately 18 V. The purpose of this is to obviate the possible attendant danger of a shock from the 110 V. A. C. should a ground occur in the apparatus, thus rendering the same entirely safe for the various purposes for which it is designed.

Contained within the casing 2, which is comprised preferably of molded "bakelite" are the operative elements of the invention and to which leads the cord 3, containing the wires 4 and 5 and which latter are connected to the windings of the core in the manner shown in Figures 5 and 15.

It will be particularly noted, especially in Figures 5 and 13 that the armature 6 is stationary relative to the coil, or to the ends of the spool 7 upon which the wire constituting the coil is wound. The core of the coil is obviously hollow and passing therethrough is a shaft, which will be referred to later by an identifying reference character. This shaft is free to oscillate to a limited degree and affixed rigidly thereto are L-shaped pole pieces 8 and 9, arranged in reversed relationship. The longer portions of these pole pieces lie on the same plane and parallel with the armature 6, which as stated previously is rigid with the spool or coil mounting. It is therefore apparent that the pole pieces are capable of movement toward and away from the armature and thus impart to the said shaft an oscillatory movement in the manner to be hereinafter more fully described. Affixed to the armature 6, at a point nearest its lower end, as shown in Figure 5 particularly, is a non-ferrous projection 10 and to which projection is rigidly affixed a spring 11, which latter is likewise on a plane parallel with the armature and has its other end fixed to the upper pole piece 9. The presence of the spring 11 in the combination maintains a torsional balance and yieldingly holds the movable pole pieces 8 and 9 normally in inoperative position preparatory to energization of the coil and consequent magnetization of the armature 6 which attracts the said pole pieces at rapid recurring intervals.

The character 14 designates the core referred to in the foregoing which latter has a deep groove milled or cut therein to the approximate center, for the purpose of allowing the core to function as one lamination to prevent overheating. It is further pointed out that the pole pieces 8 and 9 are L-shaped so that the greater portions lie on a plane

parallel with the armature 6 to obtain a more extensive pole face or attraction area for the stationary armature 6. The attraction of the armature 6 for the opposed pole pieces 8 and 9 brings about movement of the shaft 16, previously referred to, in one direction while the torsional action of the spring 11, upon the reversal of the alternating current returns the pole pieces 8 and 9 to their normally inoperative position to bring about the other movement of the said shaft 16 to complete one cycle in operation.

When it is desired to employ as an accessory, such as a tooth brush, shown in Figures 1, 2 and 10 and designated at 17, the handle of the latter is affixed to the end of the shaft 16 in the manner shown preferably in Figure 12, the latter Figure being an enlargement of the same showing in Figure 10. A coupling 18 is secured to the operative end of the oscillating shaft 16 by means of a screw 19. A ferrule 20 is capable of being received upon the coupling 18 and through the means of a pin 21, rigid with the ferrule 20, the latter is constrained to oscillate with the shaft 16, while a yielding detent 22 enters a recess in the wall of the ferrule and locks the latter against accidental release from the said coupling 18. A spring 23 allows the said pin 22 to be depressed to permit the ferrule 20 to be applied to the coupling in the manner shown in Figure 12.

As apparent also in this figure, as well as in Figures 1, 2 and 10, the end or handle of the brush 17 is rigidly held in the said ferrule 20. With further reference to Figure 12, it is pointed out that the spring 23 bears against an enlargement 24 integral with the pin 22 and since the coupling is required to be cored to receive the enlargement 24 and the spring 23, a threaded plug 25 is inserted into the core or opening to cover the same to prevent release of the said pin and springs 22 and 23 respectively. Thus, should it be desired to replace these elements, it is required only to remove the plug 25 and replace the same after the moving elements are replaced.

It may be mentioned at this point that accessories other than the brush 17 may be applied to be similarly operated by the invention and these accessories may include massaging devices, safety razors or like accessories.

With reference to the safety razor, the same oscillating mechanism is employed, although in order to operate the razor or specifically the blade of the razor, the means by which the razor head is attached must vary considerably from the coupling employed for operatively attaching the brush 17 and other accessories which require oscillatory rather than reciprocative motion.

The mode of applying the razor is illustrated in Figures 3 to 9 inclusive and in Fig-

ure 14. In this latter Figure, it is noted that the coupling 18 has a transverse slot or groove 26 in its head and in which is received the flattened end of a short shaft or pin 27. Extending outwardly from the upper end of the shaft 27 is a relatively small pin 28 and is integral with the said shaft 27.

Obviously, when the axial shaft 16 of the invention is oscillated in the manner explained briefly in the foregoing, the shaft 27 is also oscillated, thus causing the short pin 28 to oscillate to a limited extent.

Referring now to the blade 29, it is pointed out in Figure 9 that the blade has a central opening or aperture, which aperture has a small cut-out in one side and it is into this cut-out that the pin 28 projects. The razor head is composed of two elements 30 and 31, the openings 32 on either side of the central opening in the blade 29 being received by the guide pins 33 carried by the element 30 of the razor head. Thus when the three elements are assembled, that is to say, the elements 30 and 31 of the head and the interposed blade 29 in the manner shown in Figure 5, oscillating movement imparted to the transversely extending pin 28, in the manner hereinbefore mentioned, the blade 29 will be caused to move endwise in two directions, by reason of the fact that the end of the said pin 28 engages the cut-out in the blade 29 as shown in Figure 9, the said pins 33 of the head portion 30 acting as guides to prevent any lateral displacement of the said blade 29.

The foregoing explanation is believed sufficient to clearly define the operation of the head and the manner of transmitting operating movement from the instrument. The several minor elements making up the assembly by which the razor head and its associated elements, is applied operatively to the instruments will be described in greater detail later in the description.

In Figure 8, it is pointed out that the spool 7 of the electro-magnet is held in position in the casing 2 by means of screws 34 which latter enter threaded openings in the ends of the spool. It has been stated previously that the core 14 is in fact the same element as the shaft 16 and may be mentioned as being a movable core, since it has been clearly set forth that the shaft 16 operates and the element 14 and 16 being one and the same thing, it forms a supporting means for the pole pieces 8 and 9, which are rigidly secured thereto. Figure 13 very definitely shows this assembly, it being pointed out that the hollow spool 7 affords a bearing for the core or shaft bearing the two reference characters 14 and 16.

Conventional winding is provided on the spool 7 and double winding is preferred, the two windings 35 and 36 being connected in

series. In Figure 11, the wire 37 of the winding 35 is connected to the wire 38 of the winding 36, through which medium the series connection is completed.

Referring again to the specific details by which the razor head, shown in Figure 14 especially, is connected to the instrument, it is pointed out that a supplementary housing 40 in the form of a ferrule has a projecting pin 41 adjacent its lower end which is received in a recess 42 in the top of the casing 2. The said supplementary housing 40 being thus restrained against rotation with respect to the casing 2 and is frictionally prevented from being accidentally released from the casing. The housing or ferrule 40 has an interiorly threaded upper end which receives the threaded pin 43, integral with the portion 30, forming a part of the head as shown in Figure 14.

It is within this pin 43 that the short shaft 27, referred to previously, is arranged to oscillate and affords a bearing for the said shaft 27. It is believed to be apparent from the showing in Figure 14 that although the companion element 31 of the razor head and the blade 29 is not shown in this Figure, how the said blade 29 is reciprocated, especially when Figure 14 is compared to Figure 7 showing the head structure complete. It is understood that the coupling 18 is the same in Figure 14 as in Figures 10 and 12, described in the first part of the specifications. In operation, when the cord 3 is attached in the conventional manner to the usual 110 V. current, the electro-magnetic coil is instantly energized, magnetizing the armature 6 which attracts the opposing pole pieces 8 and 9, near the said armature 6 at either end of the coil. The interruptions in the A. C. will permit the spring 11 to return the pole pieces 8 and 9 to their normal inoperative position, as shown in Figure 5, to be again attracted by the magnet. This operation continues at rapid recurring intervals until the instrument is disconnected. It is clearly obvious that each time the pole pieces 8 and 9 move toward and away from the armature 6, the core or shaft 16 is oscillated and in the case of the brush 17 as an accessory, the same movement is imparted to the brush as is imparted to the said core or shaft 16. However, in the case of the razor blade 29, the oscillating movement is converted into reciprocating movement in the manner as hereinbefore fully explained.

Figures 15, 16 and 17 illustrate the variations in the oscillating instrument described in the foregoing.

In these variations, the principle is substantially the same as in the structure just described, although the armature is movable relative to the pole pieces, which latter are stationary with the coil, it being recalled that in the former case the

pole pieces were movable and the armature stationary with the coil. The same results are obtainable and the structure has been found to be equally as efficient as that described in the foregoing. In Figure 17, 44 designates the core, while the armature is identified by the character 45, which has its ends bent at right angles toward the axis of the core and rigidly affixed to the shaft 16. Thus when the armature moves, the shaft 16 is oscillated to the extent of movement of the armature 6. The pole pieces 46 are laminated and held stationary relative to the casing 2 by screws 34. In the present structure however, the shaft 16 does not extend entirely through the core but is provided with pivots 51 which permits of pivotal displacement of the armature 45 relative to the said pole pieces 46, it being pointed out that the means by which the pole pieces 46 are supported is non-ferrous, as are the pivots 51. The spring which provides for the yielding movement between the armature and the pole pieces bears the same character of reference 11, as in the previous structure, since its function is identical. A lug 47 is affixed rigidly to the armature 45, which slidably receives one end of the spring 11, while the other end of the spring is rigidly affixed to a lug 48, integral with or affixed to a brace bar 49, maintaining stationary position of the opposed pole pieces 46.

When the magnet is energized, the armature 45 will be attracted to the pole pieces 46. At the reversal of the A. C., the energization of the magnet will take place and the spring 11 will return the armature to its normal inoperative position, the result being the same as in the previously described structure.

Manifestly, the construction shown is capable of considerable modification and such modification as is considered within the scope and meaning of the appended claims is also considered within the spirit and intent of the invention.

What I claim is:

1. A device for electrically imparting oscillatory movement in the operation of instruments including an electro-magnetic coil, an axially disposed element arranged to operatively receive said instruments and capable of movement relative to said coil, an armature arranged in parallel relationship with the axis of said coil, pole pieces affixed to said element having their greatest area in parallel relationship with and exposed to said armature and arranged to be movable relative to said armature to operate said axially disposed element through the magnetic effect produced by said coil on said armature.
2. A device for electrically imparting oscillatory movement in the operation of instruments including an electro-magnetic coil, a movable member for operatively receiving said instruments, pole pieces affixed to said member and extending in either direction ex-

teriorly of said coil, an armature arranged in parallel relationship with respect to the axis of said member and arranged to attract said pole pieces when said coil is energized and means for torsionally returning said movable member to normal position.

3. A device for electrically imparting oscillatory movement for the operation of instruments including an electro-magnetic coil, a core member arranged for oscillation and disposed in parallel relationship with respect to the axis of said coil, means connected to said core member and extending alongside said coil for transmitting oscillatory movement to said core member, means affording magnetic attraction to move said latter means upon energization of said coil and means for torsionally returning said core member to normal position.

4. An electro-magnetic oscillating device including coils arranged in end to end relationship and connected in series, a movable core member, means for imparting oscillatory movement to said core member, said means including substantially L-shaped pole pieces in fixed relationship with said core member, an armature in fixed relationship with said coils and in parallel relationship with said pole pieces, intermediate means for holding said pole pieces and armature apart preparatory to energization of said coils when said pole pieces will be attracted by said armature to oscillate said core member.

5. An electro-magnetic oscillator including paired coils connected in series and having a continuous tool receiving core member arranged for oscillatory movement, an armature rigid with said coils, pole pieces affixed to either end of said core member and extending in opposite directions in parallel relationship with said coils and capable of being attracted by the magnetic effect of said armature to move said core member and means flexibly connecting said pole pieces and said armature to return said pole pieces and core member to normal position.

In testimony whereof I set my hand this 20th day of July, 1929.

MADISON P. McCARTY.