

[54] **PORTABLE BATTERY POWERED
ERASER AND SUPPORT THEREFOR**

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[58] Field of Search.....320/2; 15/DIG. 1; 30/DIG. 1;
32/DIG. 8; 240/10.6

[56] **References Cited**

UNITED STATES PATENTS

1,757,889	5/1930	Wheat.....	320/2 UX
2,622,233	12/1952	Field.....	320/2

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[57] **ABSTRACT**

A rechargeable cordless eraser comprising a carrier for supporting and electrically charging the eraser when not in use. The eraser includes socket means formed in the housing thereof adjacent one end and having a transverse retainer bar extending between opposite sidewalls of the socket. A pair of charging contact rings are spaced apart longitudinally on the retainer bar. The carrier is adapted to be attached to and supported from a drafting table or the like and includes hook means adapted to extend into the socket means on the eraser between opposite sides thereof and engage the carrier bar. The hook means includes an upwardly opening slot dimensioned for receiving said retainer bar and a pair of deflectable spring contacts are seated in the slot of the hook for supplying charging current to the contacts of the eraser and for biasing the retainer bar against the lower end of the slot to retain the eraser in hanging position on the hook when not in use.

15 Claims, 7 Drawing Figures

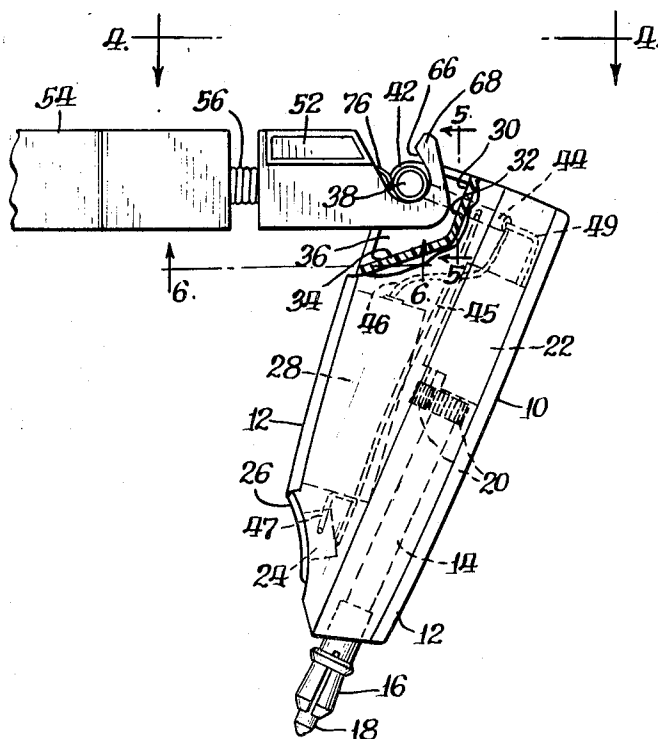


Fig. 1.

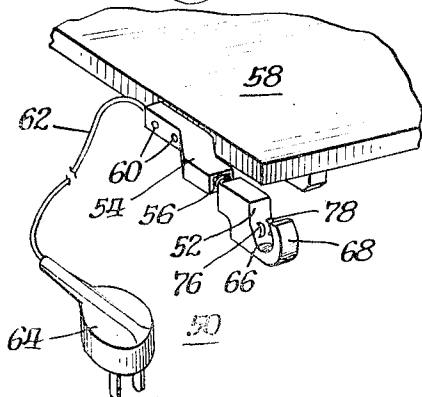


Fig. 4.

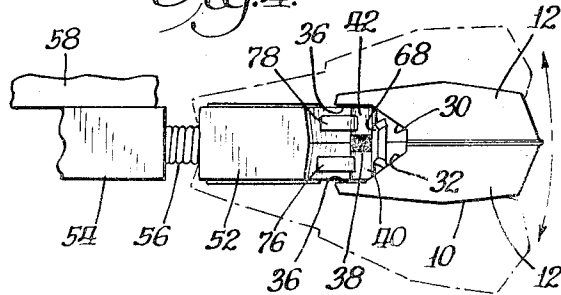


Fig. 2.

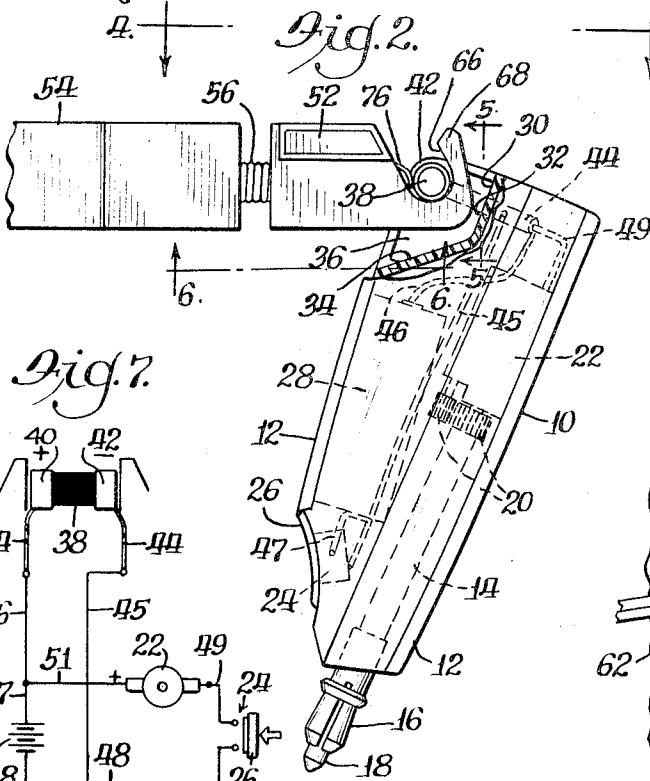


Fig. 5.

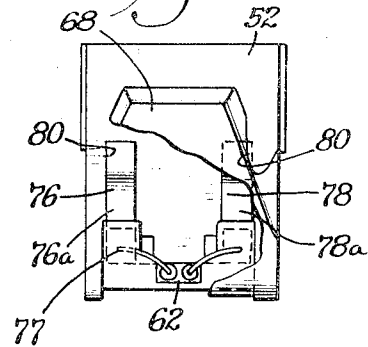


Fig. 7.

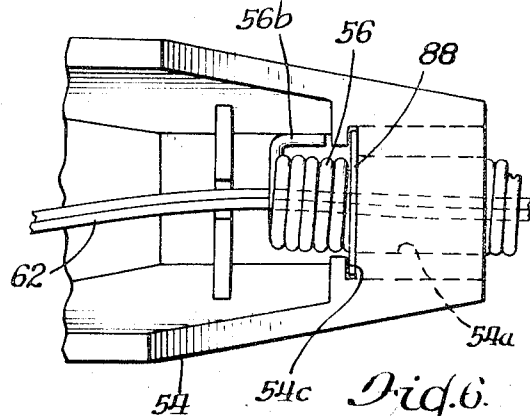
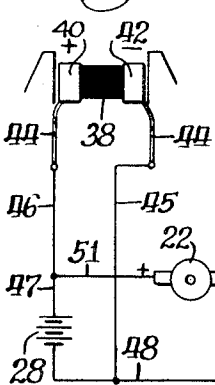
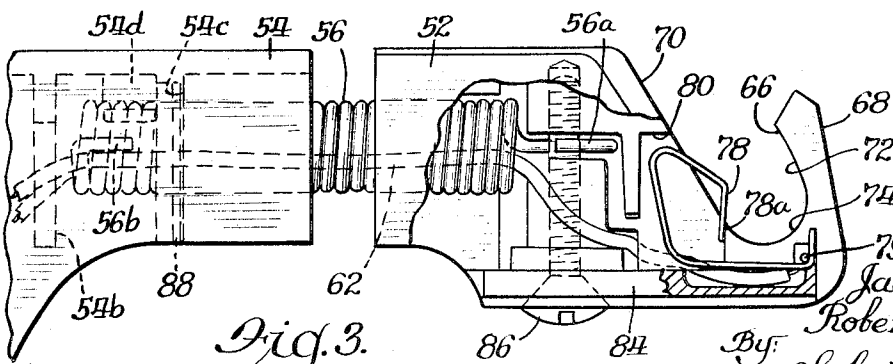


Fig. 3.



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PORTABLE BATTERY POWERED ERASER AND SUPPORT THEREFOR

BACKGROUND OF THE INVENTION

The present invention relates to a new and improved cordless, rechargeable, battery-powered, portable implement such as a cordless electric eraser which is used by secretaries, students, teachers and is especially useful to draftsmen. In many portable implements it is undesirable to have attached power cords connected therewith because it interferes with the free and unencumbered use of the implement. This is especially true with electric erasers in order to easily accomplish an erasing job that may be remote from where the implement is stored.

Accordingly, it is desirable and an object of the present invention to provide a new and improved cordless, rechargeable, battery-powered, electrical implement, more particularly, a cordless electric eraser for general use in offices and schools and hanger therefor that conveniently and safely stores the implement when not in use.

It is desirable and an object of the present invention to provide an arrangement whereby a cordless electric eraser or other implement may be handily available for use when desired and, when not in use, may be conveniently and safely stored and supported while the battery is being recharged automatically.

In addition, it is desirable to provide a new and improved cordless, portable, electric eraser which can be easily and accurately manipulated by hand and, when not in use, supported in a recharging carrier which insures that proper electrical charging polarity is established while conveniently supporting the implement in a hanging position in readiness for the next usage.

Another object of the invention is to provide a new and improved recharging support carrier for a portable electric implement, which carrier is easily adapted for universal mounting on a fixed object, such as a desk, drafting table, or wall member and which provides a hook having limited flexible movement for ease in hanging up or unhooking the rechargeable implement.

BRIEF DESCRIPTION

Briefly, the new and improved, rechargeable, portable, electrical implement of the present invention includes a carrier for supporting the implement and for supplying electrical charging current to the battery of the implement when in supported position on the carrier. The carrier is adapted to be mounted in a convenient location on a table, wall, or structural surface. The cordless electric implement includes socket means adjacent one end of the casing thereof having a transverse retainer pin or bar extending between opposite sides of the socket and including a pair of ringlike charging contacts spaced apart longitudinally on the pin for supplying recharging current to the battery contained in the housing of the implement.

The support carrier includes a hook means dimensioned as to be received into the socket of the implement. The hook means is formed with an upwardly opening slot for receiving the retaining pin when the implement is hung up for recharging when not in use. A pair of deflectable detent contacts are mounted in the slot of the hook means for making electrical contact

with and supplying current to the ring contacts on the carrier pin and the deflectable contacts bias the pin against the bottom portion of the hook slot to swingably support the implement in a hanging position ready for usage. The cooperating hook means and the socket means in the implement housing are dimensioned to provide for only one particular way of engagement therebetween, and this insures that proper polarity is achieved for supplying charging current to the battery of the implement from the contacts in the hook means.

FIGURE DESCRIPTION

FIG. 1 is a perspective view illustrating a support carrier for automatic recharging of a battery powered electrical implement as constructed in accordance with the features of the present invention;

FIG. 2 is a side elevational view of the support carrier and the portable electric eraser as it is hung up in place while being recharged automatically;

FIG. 3 is an enlarged side elevational view of the support carrier with portions broken away and fragmented;

FIG. 4 is a top plan view of the support carrier looking downwardly in the direction of the arrows 4—4 of FIG. 2;

FIG. 5 is an outer and elevational view of the support carrier with portions broken away looking in the direction of the arrows 5—5 of FIG. 2;

FIG. 6 is a fragmentary lower elevational view of the outer end portion of the support carrier looking in the direction of the arrows 6—6 of FIG. 2; and

FIG. 7 is a schematic diagram of an electrical circuit for a rechargeable cordless electric eraser of the present invention.

DESCRIPTION

Referring now, more particularly, to the drawings, therein is illustrated a new and improved rechargeable portable electric eraser for use by draftsmen, and the like. The portable electric eraser includes an elongated hollow housing 10 (FIG. 2) formed in two parts which are connected together and are preferably manufactured of molded plastic material. As shown in FIGS. 2 and 4, the housing parts or halves 12 are hollow in order to accommodate a drive shaft 14 having an eraser chuck 16 on the outer end adapted to hold an elongated, cylindrical, rubber eraser 18. The shaft 14 is driven through a pair of reduction gears 20 by a low voltage DC powered electric motor 22. The motor is controlled through a control switch 24 having a push button 26 (FIG. 7) which is conveniently located for operator manipulation. The housing or casing also holds a rechargeable nickel cadmium battery 28.

When not in use, the eraser is adapted to be hung up and supported from one end of the housing 10 which is shaped to provide a hook-receiving socket 30 formed in the upper portion of the housing 10. The socket 30 is formed by the longitudinal inner socket wall 32, a transverse bottom wall 34 which intersect one another to provide an interior corner and by opposite housing sidewalls 36. A transverse carrier pin 38 for supporting the eraser in hanging position extends between the opposite sidewalls 36 of the socket.

As shown in FIGS. 2 and 4, a pair of annular contact rings 40 and 42 are mounted on the carrier pin 38 adjacent opposite ends thereof and the midportion on the carrier pin is formed of insulating material to effect electrical insulation between the pair of contact rings.

As best shown in FIG. 2 and the wiring diagram of the portable electric eraser in FIG. 7, the contact rings are connected to suitable circuitry within the eraser housing via contact members 44 and wires 45, 46, 47, 48 and 49, for providing charging current for the battery and for delivering electrical power from the battery to operate the motor 22 as controlled by the switch push button 26.

In accordance with the present invention, a carrier assembly 50 (FIG. 1) is provided for supporting the cordless electric eraser when not in use and for automatically charging the battery 28 at this time. The carrier assembly includes a pivotably mounted hook member 52 which is connected to a fixed base 54 by an elongated, helically coiled spring 56. The spring connection permits relative pivotal movement between the base and hook members about the longitudinal axis of generation of the helical spring as well as limited flexible movement between the base and hook in both directions about axes horizontally and vertically transverse to said longitudinal axis of the spring.

As the portable electric eraser is hanging in place or moved into or out of hanging position, this limited flexible movement of the hook provides ease of action. The base 54 is adapted to be fixedly and permanently attached to a drafting table 58 or other structures by means of fasteners 60.

The current for recharging the battery 28 in the portable electric eraser is supplied through a line cord 62 having a plug assembly 64 at the end thereof which is adapted to be inserted into a conventional AC outlet. The plug assembly 64 contains a rectifier and a voltage reducing circuit for converting the AC voltage from a convenient outlet to low voltage DC current for recharging the battery 28 of the portable electric eraser.

As best shown in FIG. 3, the hook member 52 includes an upwardly opening carrier bar receiving slot 66 which is defined by an outer finger portion 68 adjacent the outer end. The slot 66 includes parallel sides 70 and 72 sloped with respect to the vertical, which are spaced apart a distance slightly larger than the diameter of the carrier bar 38 and the contact rings 40 and 42 thereon. The lower end of the slot is defined by a closed rounded end or stop surface 74 of substantially the same or slightly larger diameter than the contact rings 40 and 42.

In accordance with the present invention, the carrier pin 38 is biased toward the closed lower end 74 of the slot 66 while the cordless electric eraser is hung on the hook 52 by a pair of deflectable contact members 76 and 78 (FIG. 4). Free end portions of the contacts 76 and 78 project outwardly from the rear side 70 of the slot 66 toward the adjacent or front side 72. The contacts 76 and 78 include outer end portions 76a and 78a (FIG. 5), respectively, which are adapted to engage the respective contact rings 40 and 42 and make electrical contact therewith for charging the battery 28. In addition, the contacts bias the carrier pin downwardly against the lower end surface 74 of the slot 66 in the

hook to prevent accidental dislodgment from the hook. As the carrier pin 38 is moved into or out of the slot 66, the contacts, and particularly the end portions 76a and 78a, thereof, are deflected inwardly toward the inside rear wall surface 70 of the slot and subsequently spring back outwardly toward the opposite wall 72. The contacts 76 and 78 thus perform a dual function in making electrical contact between the respective wires of the line cord 62 and the contact rings 40 and 42 on the rechargeable portable electric eraser and, in mechanically holding and retaining the carrier pin 38 in a downwardly biased condition against the lower end surface 74 of the slot 66 in the hook member 52.

Referring again to FIG. 3, one of the leads of the cord 62 is connected to the contact 78 at the connection terminal 79. Similarly, the other lead in the line cord 62 is connected to the contact 76 as best shown in FIG. 5 at the connection terminal 77. The contacts 76 and 78 are connected to provide for the correct polarity to supply charging current to the respective contact rings 40 and 42 on the eraser. The respective contacts 76 and 78 are mounted in the hook 52 so that the outer free end portions 76a and 78a act against the edges of slots 80 (FIG. 3) formed in the hook member and dimensioned to a width substantially equal to the width of the contacts. As best shown in FIG. 3, the contacts are freely deflectable by the carrier pin and rings 40 and 42 and are preferably formed of resilient springlike metal having good electrical conductance.

The underside of the hook member 52 is covered by a closure plate 84 (FIG. 3) which is held in place by a cap screw 86 which projects upwardly into a threaded boss portion formed in the hollowed out underside of the hook member, as best shown in FIG. 3. The hollowed out portion accommodates the forward end of the helically coiled spring 56, and the screw 86 projects upwardly through the forward end loop 56a of the spring which is bent transversely to the other coils in the body of the spring. The screw 86 thus prevents the forward end of the spring from rotating relative to the hook member 52 and accomplishes the fixed connection between the spring 56 and hook member 52.

The intermediate coils of the spring 56 provide a tubular enclosure for enclosing and protecting the line cord 62 which extends forwardly from a hollowed out underside of the fixed base 54 into the hollowed out underside of the hook member 52. As shown in FIGS. 2, 3 and 4, there is provided a space between the adjacent facing end surfaces of the base and hook member and this permits limited lateral deflection of the hook member 52 in a cantilever fashion relative to the base. The base is usually permanently attached to a convenient support structure, such as the edge or bottom of a drafting table, and the like, and the spring connection permits the hook member 52 to deflect transversely in a vertical direction as well as in a horizontal direction. This action facilitates the hanging up of the eraser after usage and makes it easier to guide the carrier pin 38 of the portable electric eraser into the slot 66 of the hook member 52. It should be noted that the stop walls 32 and 34 which define the inner socket corner in the eraser housing 10, prevent the improper engagement of the carrier pin within the slot in a manner which might cause reverse polarity of the charging. These walls are positioned to permit insertion of the

hook 52 into the socket 30 in only one way (shown in FIG. 2), and, when inserted in this manner, correct polarity of current from the charging line cord 62 through the spring contacts 76 and 78 to the contact rings 40 and 42 on the electric eraser is insured.

As best shown in FIG. 3, the rearward end portion of the spring 56 extends into the base 54 through a horizontal bore 54a (FIG. 6) and rearwardly thereof the underside of the base is hollowed out, as at 54b (best shown in FIGS. 3 and 6) in order to permit several of rearward end coils of the spring to freely rotate within the base structure. The rear end of the spring is deformed so that a tang 56b is bent to project forwardly toward the hook member 52. The tang 56b is adapted to limit the extent of rotation of the rearward end of the spring 56 about the longitudinal axis of the spring relative to the base. The tang is engageable with a radially inwardly directed, integrally formed stop member 54d (FIG. 3) and, accordingly, the relative rotation between the spring 56 and the base 54 is limited to one revolution, or slightly less, as permitted by the relative position of the tang and stop.

In order to retain the rearward end portion of the coil spring 56 within the base 54 and prevent forward withdrawal of the spring, a retaining insert of thin material as shown as 88, is inserted into a downwardly opening, thin, transverse slot 54c, defined in the underside of the base (FIG. 6). The retaining sheet 88 includes a central aperture therein slightly larger than the outside diameter of the coils of the spring 56, and the forward end tang 56b is engageable against the retainer to prevent forward withdrawal of the spring from the base.

It will be appreciated that the construction of the carrier assembly just described provides a unique and particularly valuable technique for storing the implement. The hook member is adapted for limited movement sideways, and up and down relative to the base and the implement itself is swingably mounted in the hook member 52. In the circumstance that the mounted implement is suddenly jarred, the nature of the mounting is such that it would absorb the sudden movement through the combination of the swinging action of the carrier pin 38 disposed in the slot 66 of the hook member 52 and the pivotable movement of the member 52 relative to the base 54.

While there has been illustrated and described a single embodiment of the present invention, it will be appreciated that numerous changes and modifications will occur to those skilled in the art, and it is intended in the appended claims to cover all those changes and modifications which fall within the true spirit and scope of the present invention.

What is claimed as new and desired to be secured by Letters Patent Of the United States is:

1. In combination, a support carrier for holding an electrically charging battery powered portable implement, such as cordless electric erasers and the like, said implement including a housing defining a socket means adjacent one end and a transverse retainer bar extending between opposite sides of said socket, means including a pair of charging contacts spaced longitudinally on said bar, said carrier including hook means adapted to extend into said socket means between opposite sides thereof and including an upwardly opening

slot for receiving said retainer bar of said implement, and a pair of deflectable contacts in said slot for supplying current to said charging contacts on said implement and biasing said retainer bar against wall surfaces of said slot to support said implement in hanging position from one end while not in use.

2. The combination of claim 1 wherein said carrier including a base adapted to be attached to a fixed object, such as a table, or the like, and longitudinal connector means interconnecting said base and said hook means permitting relative rotation between said hook means and said base around the longitudinal axis of said connector means.

3. The combination of claim 2 wherein said connector means comprises a spring permitting limited angular deflection between said base and hook means transversely of said longitudinal axis.

4. The combination of claim 2 wherein said connector means comprises a helical coil spring with a plurality of said coils wound around said longitudinal axis, at least one end of said coil spring mounted for rotation around said axis relative to said base.

5. The combination of claim 4 including line cord means for supplying current to said contacts in said hook means, said line cord means extending between said base and said hook means through the coils of said spring along said longitudinal axis.

6. The combination of claim 5 wherein said line cord means includes plug means at the free end for connection to an AC power source and rectifier means for converting AC to DC for supply to said contacts.

7. The combination of claim 4 including stop means for limiting rotation of said end coil relative to said base.

8. The combination of claim 1 wherein said socket means is defined adjacent a corner of said one end of said implement and includes at least one stop wall preventing said hook means from entering said socket means from a wrong direction thereby to insure proper polarity for recharging said implement.

9. The combination of claim 8 wherein said contacts on said retainer bar are positioned adjacent opposite sidewalls of said socket means and are spaced apart by a midportion of said bar.

10. The combination of claim 1 wherein said slot in said hook means includes a pair of sloped opposite walls terminating in a rounded end, said contacts on said hook means including cam portions projecting outwardly of one wall toward said opposite wall and sloped to bias said carrier bar toward said rounded end.

11. A support carrier for holding and electrically charging a battery powered portable implement, said implement including a housing defining a socket means adjacent one end thereof, a transverse retainer bar extending between opposite sides of said socket, means including a pair of charging contacts spaced longitudinally on said bar, said carrier comprising a fixed base portion and an implement receiving portion, means interconnecting said base and receiving portions comprising resilient biasing means movably attaching said receiving portion to the base portion, said receiving portion further including an upwardly opening slot for receiving said retainer bar of said implement and means connecting said charging contacts to a source of electric current.

12. The support carrier as claimed in claim 11 wherein said upwardly opening slot is equipped with a pair of deflectable contacts in said slot for supplying current to said charging contacts on said implement and biasing said retainer bar against wall surfaces of said slot to support said implement in hanging position from said one end.

13. The support carrier as claimed in claim 11 wherein said resilient biasing means is a coiled spring extending along a longitudinal axis between said base and receiving portion having its free ends fixed respec-

tively to said base portion and receiving portion permitting limiting angular deflection between said base and receiving portion relative to said longitudinal axis.

14. The support carrier of claim 13 including mounting means for securing one end of said biasing means to the receiving portion permitting rotation between the receiving portion and the base.

15. The support carrier of claim 14 including stop means for limiting rotation of said end coil relative to said base biasing means.

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