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M. M. COHEN
MOTOR DRIVEN ERASER

2,917,023

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2 Sheets-Sheet 1

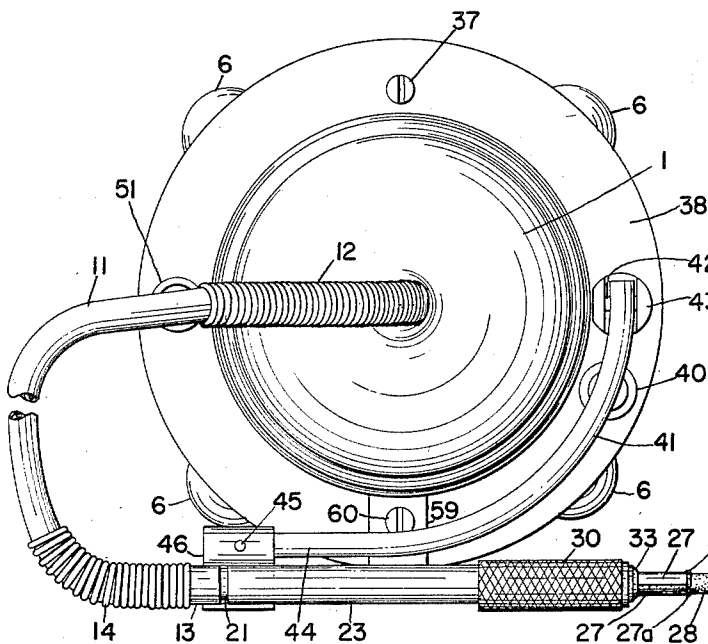
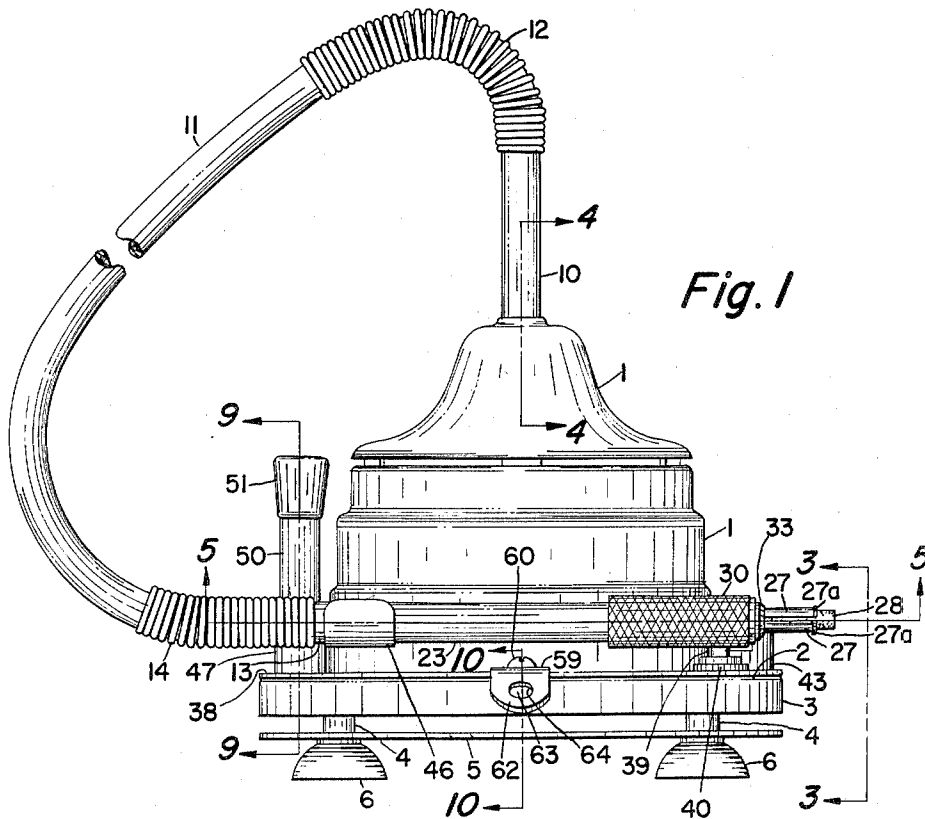


Fig. 2

INVENTOR.

MAURICE M. COHEN

BY

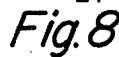
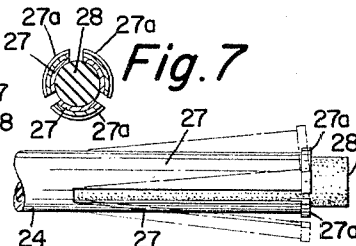
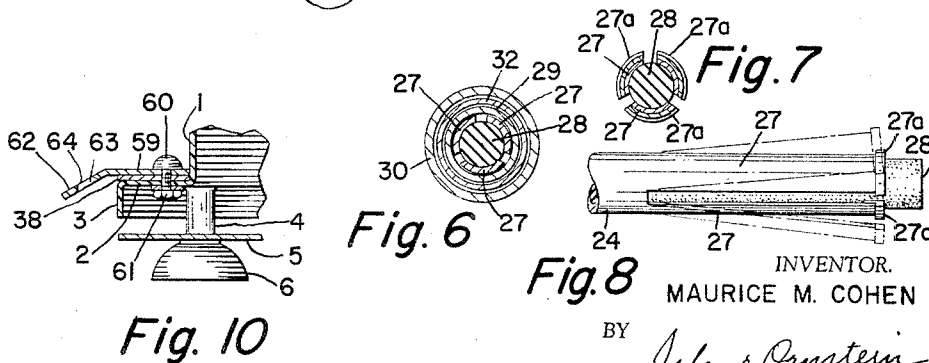
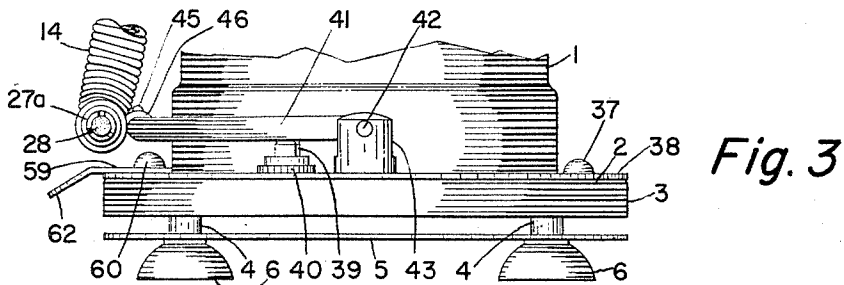
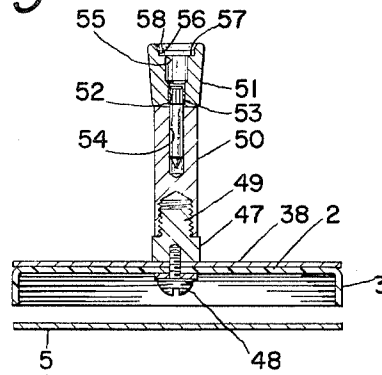
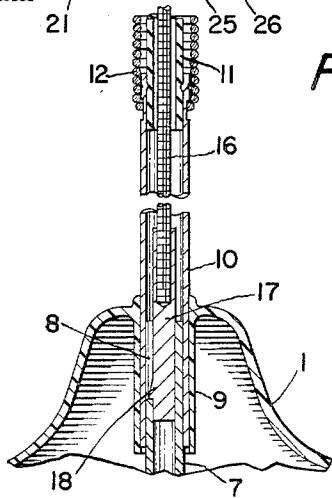
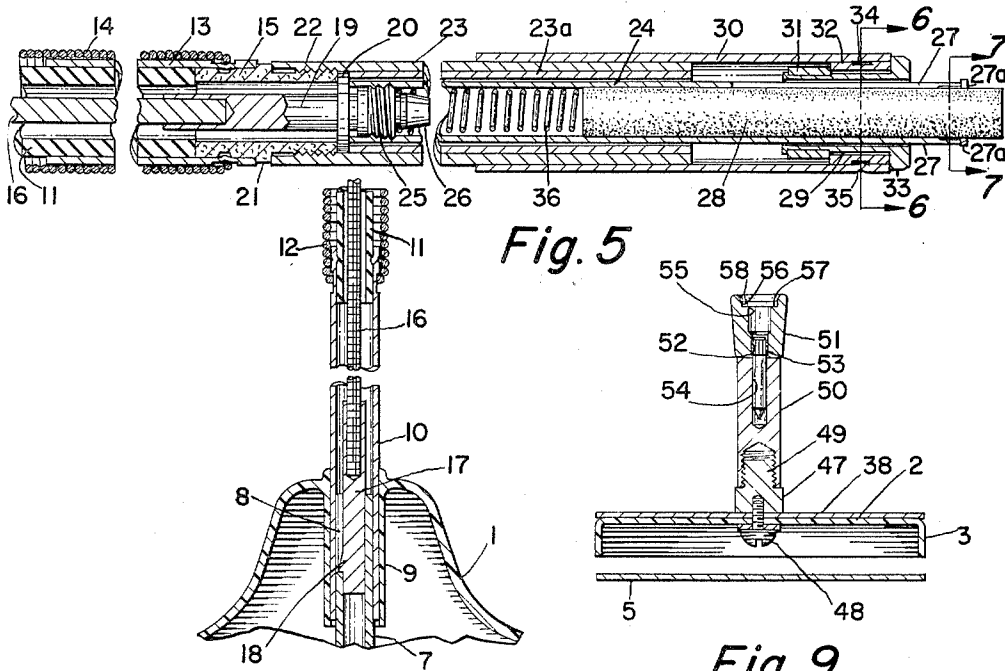
Isler & Ornstein

ATTORNEYS

M. M. COHEN
MOTOR DRIVEN ERASER

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INVENTOR.
MAURICE M. COHEN

BY

Isher & Ornstein

ATTORNEYS

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2,917,023

MOTOR DRIVEN ERASER

Maurice M. Cohen, Cleveland Heights, Ohio

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10 Claims. (Cl. 120-36)

This invention relates generally to motor driven erasers. A primary object of the invention is to provide a device of the character described, which is light in weight and is extremely efficient for the purposes for which it has been designed.

Another object of the invention is to provide a device of the character described, having means incorporated therein for automatically feeding an eraser rod.

A further object of the invention is to provide a device of the character described, having means incorporated therein for controlling the extent of the eraser rod feed-out.

A further object of the invention is to provide a device of the character described, having means incorporated therein for automatically starting the motor when the device is put in use.

A still further object of the invention is to provide a device of the character described, having means incorporated therein for enabling worn portions of the eraser rod to be cut off, so as to provide a sharp edge on the eraser rod for extremely fine and accurate erasures.

Other objects and advantages of my invention will be apparent during the course of the following description.

In the accompanying drawings forming a part of this specification, and in which like numerals are employed to designate like parts throughout the same,

Fig. 1 is a front elevational view of the motor driven eraser;

Fig. 2 is a top plan view of the motor driven eraser;

Fig. 3 is a fragmentary side elevational view, as viewed in the direction indicated by the arrows 3-3 in Fig. 1;

Fig. 4 is a fragmentary cross-sectional view, taken on the line 4-4 of Fig. 1;

Fig. 5 is a fragmentary cross-sectional view, taken on the line 5-5 of Fig. 1;

Fig. 6 is a fragmentary cross-sectional view, taken on the line 6-6 of Fig. 5;

Fig. 7 is a fragmentary cross-sectional view, taken on the line 7-7 of Fig. 5;

Fig. 8 is a fragmentary elevational view, showing in broken lines, the open position of the fingers of the spindle;

Fig. 9 is a fragmentary cross-sectional view, taken on the line 9-9 of Fig. 1, and

Fig. 10 is a fragmentary cross-sectional view, taken on the line 10-10 of Fig. 1.

Referring more particularly to the drawings, there is disclosed a housing 1 of plastic or like material, having an annular base portion or ledge 2, terminating in a downturned flange or skirt 3.

The base portion 2 is provided with integral circumferentially-spaced bosses or lugs 4, to which a metallic disc 5 is secured, as by means of rubber suction cups 6, which are provided at their upper ends with threaded stems (not shown) which extend through the disc 5 and are threaded into the bosses or lugs 4. These suction cups function as feet which hold the motor driven eraser firmly on a drafting table at all normal operating angles.

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Mounted on the disc 5, within the housing 1, is an electric motor (not shown) having a driven hollow vertical shaft 7 (see Fig. 4), having an elongated slot 8 in its upper end. The housing 1 is provided at its upper end with a sleeve 9, formed integrally with the housing.

The sleeve 9 is adapted to receive the metallic end casing 10 of a flexible cable plastic covering or housing 11, a coil spring 12 being secured to the casing 10 and encompassing the joint between the casing 10 and covering 11 to prevent undue flexure at this joint, which might cause breakage at the joint. The covering 11 has a metallic end casing 13 (Fig. 5) secured to its other end, and a coil spring 14 is secured to this casing and encompasses the joint between the covering 11 and casing 13 to prevent undue flexure at this joint, which might cause breakage at the joint. The casing 13 is rigidly connected to a thrust element 15, as shown in Fig. 5.

Disposed within the cable covering 11 is a flexible driven cable, for example, a Bowden wire 16. One end of this wire has attached thereto a coupling 17 (Fig. 4), which is adapted to be received in the hollow motor drive shaft 7 and has a key 18 which is received in the slot 8, whereby the cable 16 is driven by the shaft 7.

The other end of the wire 16 has attached thereto a coupling 19, (Fig. 5) hereinafter referred to as a spindle driver. The spindle driver 19 is journaled for rotation in a thrust element 15, of fibre or like material, and is provided adjacent its forward end with an annular flange 20 which is adapted to bear against the forward end of the thrust element 15. The thrust element 15 is provided intermediate its ends with an annular flange 21 against which the end of the casing 13 bears, and forwardly of this flange, the thrust element is threaded, as at 22 for the connection thereto of an elongated handle 23. Rigidly secured within the handle 23 is a bronze bearing or bushing 23a, the rear end of which bears against the flange 20 of the spindle driver 19.

Mounted for rotation in the bushing 23a is a spindle 24, the rear end of which is threadedly connected to a threaded stem 25 of the spindle driver 19, the stem 25 being provided with a tapered or conical end 26. The front end of the spindle 24 is split longitudinally at circumferentially-spaced points to provide three circumferentially-spaced clutch fingers 27, which have an inherent resiliency which is such that they normally are disposed at a slight angle to the axis of the spindle, as shown in broken lines in Fig. 8, but which may be moved into clamping relationship with an eraser by means which will be presently described. These fingers have welded to the inner faces of their forward ends hardened steel jaws 27a.

The forward portion of the spindle 24 is adapted to receive an eraser, in the form of a cylindrical rod 28, which is rotatable by the spindle when the jaws 27a are moved into clamping or clutching engagement with the rod.

Means have been provided for closing the jaws 27a into clamping or clutching engagement with the rod 28. Such means comprises a hub member 29, which is mounted loosely about the spindle 24, between the base of the fingers 27 and the forward end of the handle 23.

The hub member 29 is of cylindrical form, and is so constructed that it may rotate within a thimble 30, while being moved forwardly by this thimble to close the jaws 27a. For this purpose, the hub member 29 has rigidly secured thereto an end collar 31, and a thrust member 32 is interposed between the head 33 of the hub member 29 and the collar 31. The thrust member 32 has an annular recess or groove 34 in its outer surface, and the thimble 30 has a protrusion 35. The thimble 30 is slidable longitudinally over the forward portion of the handle 23, which it encompasses. This construction permits all of the parts 29 and 32 to be rotatable independently of

each other and of the thimble 30, while the thimble is held in the hand of the user. The exterior surface of the thimble 30 is knurled to facilitate use of the device.

After an eraser 28 has been inserted into the spindle 24, and properly positioned for use, the thimble 30 may be moved forwardly, thereby moving the hub member 29 along the fingers 27, thereby forcing the jaws 27a to grip or clamp the eraser and cause the eraser to rotate with the spindle 24. This clamping or gripping action may be continued even after the eraser has already been lightly gripped and has already begun to rotate with the spindle. This is possible due to the fact that the closer hub parts are as previously stated, rotatable independently of the thimble 30.

Means have also been provided for automatically feeding the eraser out of the spindle after the end of the eraser has become worn, so as to present fresh portions of the eraser for use. For this purpose, a compression coil spring 36 is disposed within the spindle 24, and is interposed between the rear end of the eraser 28 and the conical end 26 of the stem 25 of the spindle driver 19. The rear end of the spring 36 is connected to the stem 25 of the spindle driver 19, to prevent it from becoming detached from the spindle 24.

When it is desired to thus automatically feed the eraser out of the spindle, the user can draw back the thimble 30 slightly, sufficiently to relieve the pressure of the jaws 27a on the eraser, thus permitting the spring 36 to expand sufficiently to push the eraser forwardly. This forward movement of the eraser can be easily controlled, in a manner to avoid expelling of the eraser wholly from the spindle, since the user can quickly and easily move the thimble 30 forwardly to again cause the eraser to be firmly gripped.

Secured to the base portion or ledge 2 of the housing 1, as by screws 37, is an annular metallic washer 38, on which is mounted the button 39 of a spring-loaded switch 40, which controls the circuit to the motor. When this button is in its normal or elevated position, the motor is energized, and when the button is depressed, the circuit to the motor is closed.

Means have been provided for depressing the button 39 when the eraser is not in use. Such means comprises an arcuate member 41, which is mounted for pivotal movement about a pin 42 secured in a post 43, which is connected to the base washer 38 by suitable means, not shown. This member 41 overlies the button 39, and is provided with a straight portion 44 extending tangentially to the housing, and the outer end of which has secured thereto, as by a pin 45, a cradle 46.

When the handle 23 is laid upon the cradle 46, in the manner shown in Figs. 1, 2 and 3 the weight of the handle and the parts associated therewith is sufficient to push the member 41 downwardly to the position shown in these figures, thereby automatically depressing the button 39, and stopping the motor. When the handle 23 is lifted from the cradle 46, that is to say, when the eraser is to be used, the tension of the spring under the button 39 is sufficient to raise the button and the member 41 sufficiently to automatically start the motor.

Means have also been provided for automatically feeding the eraser from the spindle 24 as well as for controlling the extent of the feed-out, all without having to stop the motor. Such means is best illustrated in Fig. 9 of the drawings, and comprises a post 47, which is secured to the base 2, as by means of a screw 48. The post 47 has a threaded portion 49 of reduced diameter, to which a bearing member 50 is secured. Mounted on the upper end of the member 50, is a conical socket member 51, having an axial bore 52, in which is rigidly secured a pin 53. The pin 53 is journaled for rotation in a bore 54 of the bearing member 50, so that the socket member is freely rotatable about a vertical axis.

The bore 52 is counterbored, as at 55, this counterbore being of a diameter, which is about .010"-.015" greater

than the diameter of the eraser 28, which diameter is about .205". The counterbore 55 is further counterbored, as at 56, to provide a shoulder or ledge 57, the counterbore 56 having a conical or tapered inlet portion 58.

When it is desired to feed the eraser out of the spindle 24, the jaws 27a are introduced into the counterbore 56, being guided therein by the conical wall 58, to bring these jaws against the shoulder 57. With the jaws thus positioned, and the hand bearing against the handle 23, the thimble 30 is raised slightly to momentarily relieve the grip of the jaws 27a on the eraser. The expansion of the spring 36 then pushes the eraser out of the spindle 24 until the forward end of the eraser reaches the top of the pin 53, so that no further movement of the eraser can take place. The eraser is thus fed out of the spindle a predetermined or fixed amount, which is the proper length. Due to the fact that the socket member 51 is freely rotatable, the eraser, during this operation, will rotate at the same speed as the socket member.

Following this, the thimble 30 is pushed downward slightly to close the jaws on the eraser, after which the jaws may be lifted out of the socket member 51. All this is accomplished without stopping the motor.

Means have also been provided for permitting the worn end of the eraser to be quickly and easily cut off to produce a sharp edge on the eraser for extremely fine and accurate erasures.

Such means is best illustrated in Figs. 1, 2, 3 and 10, and comprises a plate 59 secured to the washer 38 and base 2, as by a screw 60 and nut 61. The plate 59 is provided with a downwardly extending inclined portion 62 having an opening 63 therein, the wall of which is conical to provide a sharp circular edge 64. This opening is slightly larger in diameter than the diameter of the eraser 28, so that when the eraser, while rotating, is introduced into the opening and brought to bear against the sharp edge 64, this edge acts as a knife to cut off the worn end of the eraser.

It is thus seen that I have provided a device, which constitutes a complete erasing machine of high efficiency, which is light in weight, so as to render it portable to any desired position, and by means of which erasures can be made economically and neatly. The handle or handpiece is extremely light in weight and is as easy to control as a draftsman's balanced pencil. Erasure may be made without effort, and over an area determined or circumscribed only by the length of the flexible shaft. The erasers are driven at a most desirable peripheral speed, and after becoming worn down, may be easily replaced in a matter of seconds.

It is to be understood that the form of my invention, herewith shown and described, is to be taken as a preferred example of the same, and that various changes may be made in the shape, size and arrangement of parts of my invention, without departing from the spirit of the invention or the scope of the subjoined claims.

Having thus described my invention, I claim:

1. In an eraser of the character described, a rotatable spindle, an eraser rod disposed within said spindle and adapted to be rotated by said spindle, means for gripping said eraser rod, said means including gripping fingers and a hub member encompassing said fingers and slidable along said fingers, and means for automatically feeding the eraser rod from the spindle upon release of said gripping means including means for releasing the grip of said gripping means, said releasing means comprising a thimble slidable longitudinally in relation to said spindle.

2. In an eraser of the character described, a flexible driving shaft, a spindle driver driven thereby, a hollow spindle driven by said spindle driver, an eraser rod movable longitudinally of said spindle, means on said spindle for gripping said rod to cause the rod to be driven by the spindle, means for releasing the grip of said gripping means, and spring means responsive to said release for

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automatically feeding said eraser rod relatively to said spindle said releasing means comprising a hub member, a thrust member and a thimble concentric with each other, and rotatable independently of each other.

3. A stop for controlling the feed-out of a feedable eraser rod, said stop comprising a bearing member having a bore therein, a socket member mounted on said bearing member and having a pin rigidly secured therein and rotatable in said bore, said pin constituting a stop for said rod, said socket member having a counterbore providing a shoulder in axially-spaced relation to said pin and constituting a second stop.

4. In an eraser of the the character described, a base member, a motor mounted on the base member with its drive shaft in a position other than horizontal, an eraser, means mounting the eraser for rotation, a flexible shaft interposed between said motor shaft and eraser for rotating the eraser, said motor being automatically energized when the eraser is in use, a switch button on the base member adapted to be depressed when the motor is to be deenergized, and means for depressing the switch button, said means comprising a member mounted on the base member for pivotal movement about a horizontal axis in overlying relation to the switch button and a cradle supported by said member, and adapted to receive and support the eraser when not in use, said member moving in response to depositing of the eraser on said cradle to engage and actuate said switch button to deenergize said motor.

5. In an eraser of the character described, a motor mounted with its drive shaft in a position other than horizontal, an eraser, a flexible shaft interposed between said motor shaft and eraser for rotating the eraser, said motor being automatically energized when the eraser is in use, a switch button adapted to be depressed when the motor is to be deenergized, and means for depressing the switch button, said means comprising a member mounted for pivotal movement about a horizontal axis and a cradle supported by said member, said member being depressed in response to depositing of the eraser on said cradle for depressing said switch button to deenergize said motor, said switch button depressing member partially encircling the housing of said motor.

6. An eraser, as defined in claim 4, in which said switch button is spring-loaded, and the pressure of said spring is sufficient to elevate the button and said member when the eraser is lifted from the cradle, thereby energizing said motor.

7. In an eraser of the character described, a flexible driving shaft, a hollow spindle driven by said flexible shaft, an eraser rod movable longitudinally of said

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spindle, means on said spindle for gripping said rod to cause the rod to be driven by the spindle, means for releasing the grip of said gripping means, said releasing means comprising a hub member and a thimble concentric with each other, and rotatable independently of each other and of said spindle, and spring means responsive to said release for automatically feeding said eraser rod relatively to said spindle.

8. An eraser, as defined in claim 7, in which said spring means comprises a compression coil spring interposed between the flexible driving shaft and said eraser rod.

9. In a device of the character described, a rotatable spindle, an eraser rod adapted to be driven thereby, spring means for automatically feeding said rod out of said spindle, and means for automatically stopping the feed-out of the eraser rod, without stopping the rotation of the eraser rod, said means comprising a rotatable socket member having a shoulder against which the end of said spindle bears and a stop in said socket member, in axially-spaced relation to said shoulder and against which the end of said eraser rod bears to limit the feed-out of said rod, the axial spacing of said shoulder and stop determining the extent of said feed-out.

10. In a device of the character described, a motor housing, a rotary electrically-driven motor in said housing, a handpiece having an eraser rod therein, means for mounting the eraser rod within the handpiece for rotation, means for rotating the eraser rod by said motor, and means mounted on said motor housing for cutting off the worn end of said eraser rod, said means comprising a thin flat plate having an opening therein of a diameter larger than the diameter of the eraser rod, the wall of said opening being conical, whereby to provide a sharp annular knife-like edge at the junction of said opening with one of the surfaces of said plate, said eraser rod being engaged with said knife edge, rotation of said rod causing cutoff of the worn end thereof.

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