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Kim

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[54] **BATTERY OPERATED NAIL FILE APPARATUS**

[76] Inventor: **Tae S. Kim**, 122-12 20th Ave., College Point, N.Y. 11356

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[51] **Int. Cl.**[6] **A45D 29/05**; A45D 29/18

[52] **U.S. Cl.** **132/73.6**; 132/76.4

[58] **Field of Search** 132/73.6, 75.6, 132/75.8, 76.4

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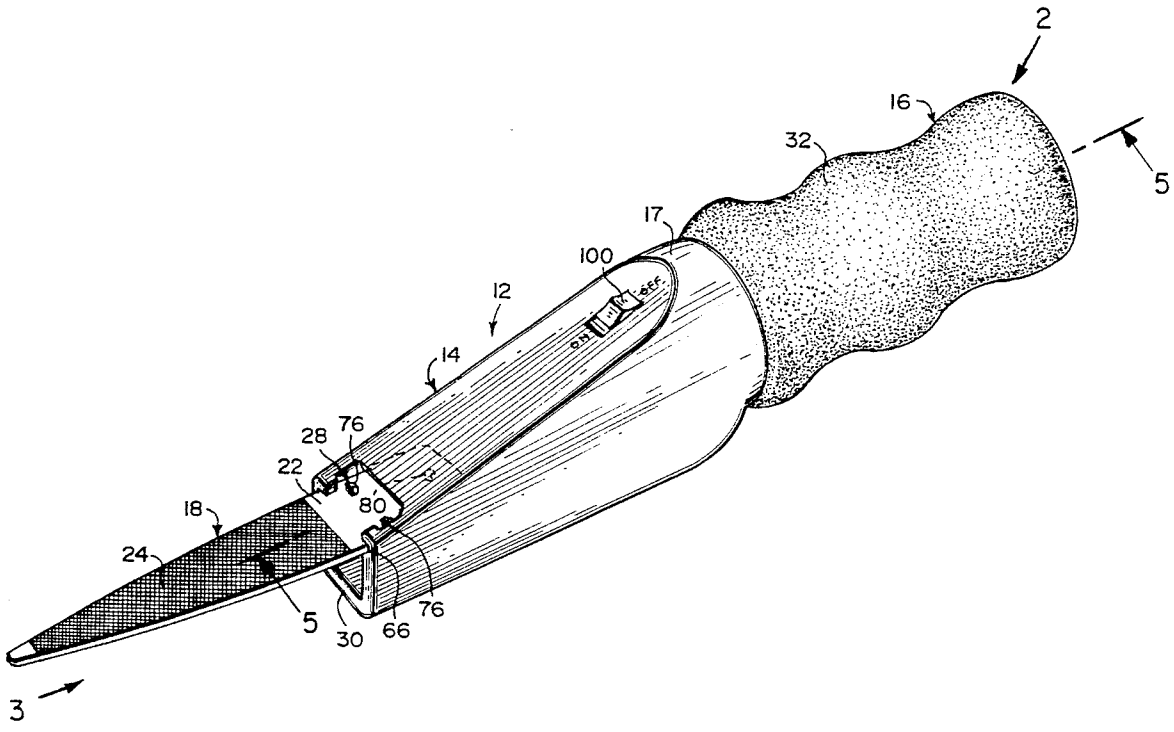
Primary Examiner—John G. Weiss
Assistant Examiner—Elise P. Speaks
Attorney, Agent, or Firm—Michael I. Kroll

[57] **ABSTRACT**

A nail file apparatus is provided which consists of a housing with a handle extending from a rear portion of the housing. A nail file has a tip portion, a heel portion and ridges therebetween. A mechanism within said housing is for causing a reciprocating movement. A structure is for coupling the heel portion of the nail file to the reciprocating movement mechanism at a front portion of the housing. A person can grip the handle and activate the reciprocating movement mechanism, to operate the nail file extending therefrom. The ridges will automatically smooth, polish and shape the fingernails.

1 Claim, 2 Drawing Sheets



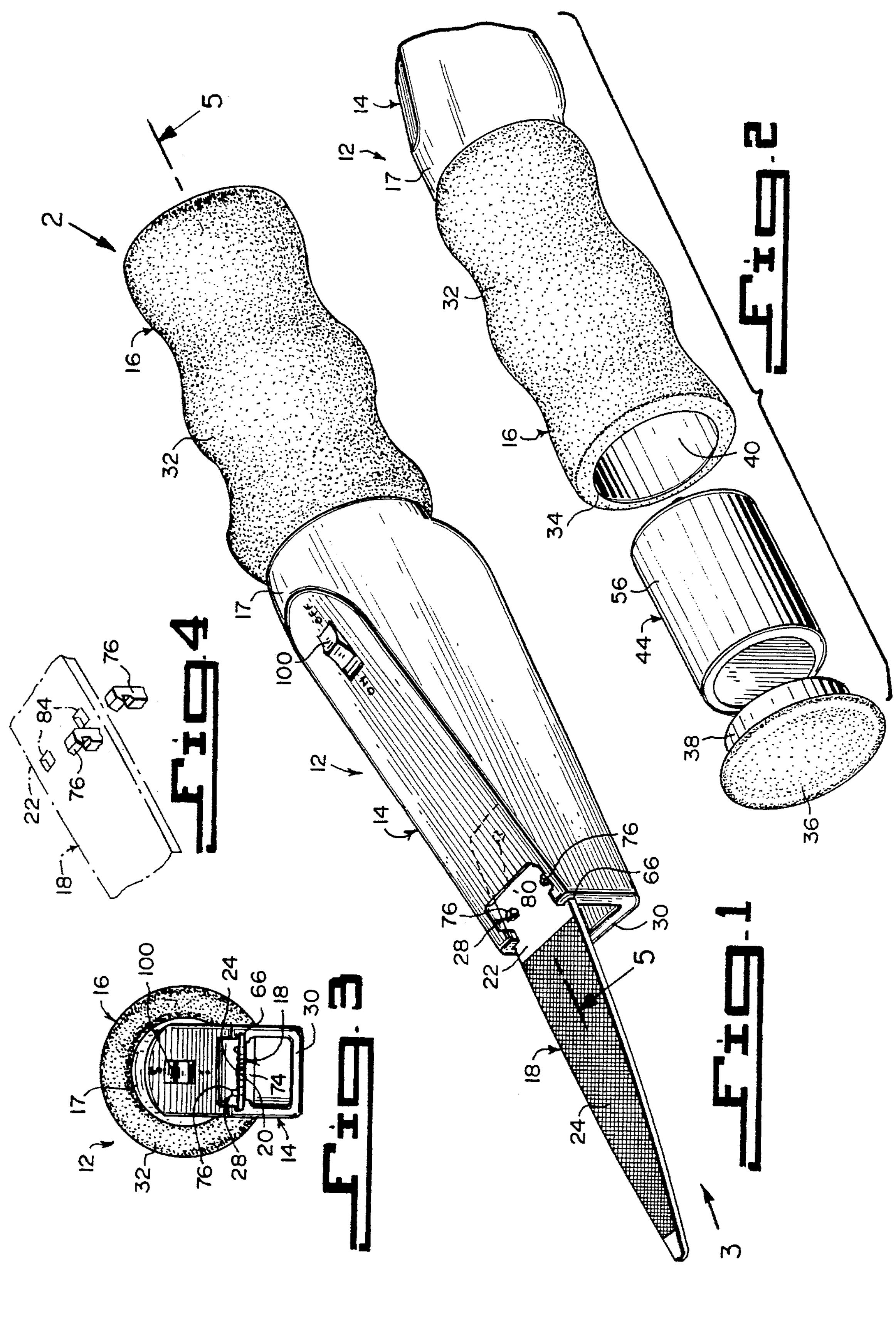


Fig-1

Fig-2

Fig-3

Fig-4

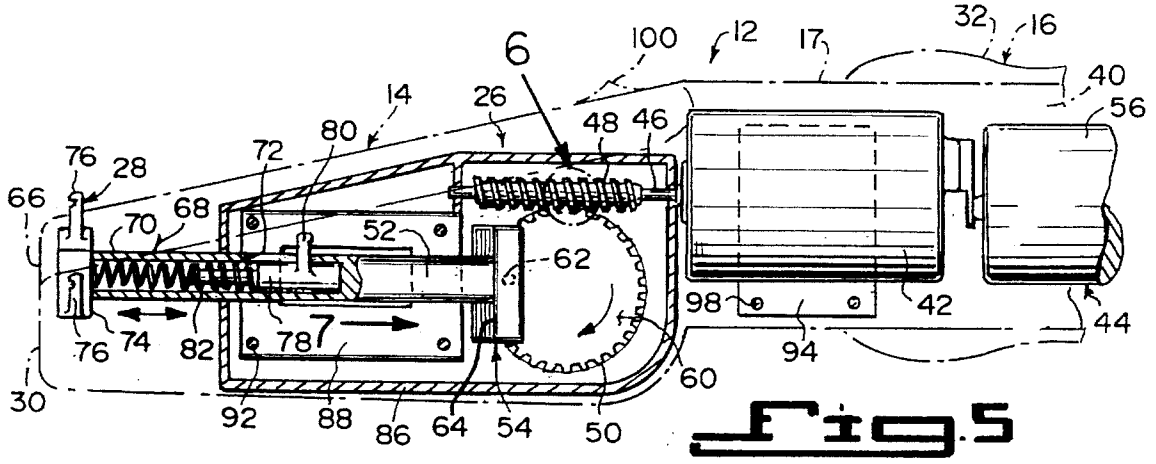


Fig. 5

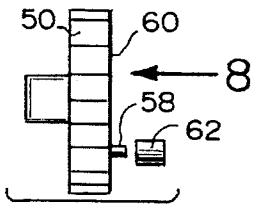


Fig. 7

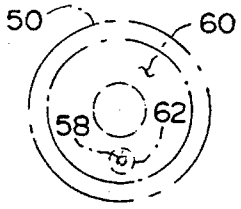


Fig. 8

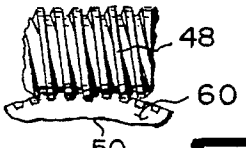


Fig. 6

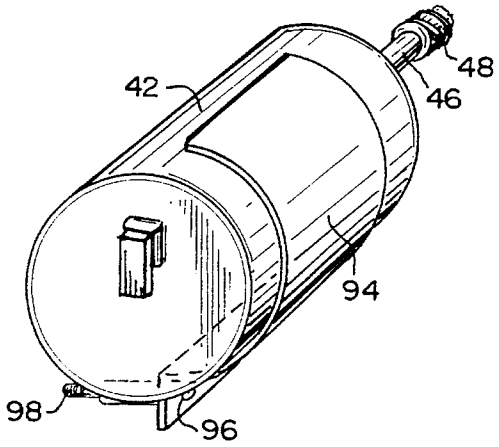


Fig. 9

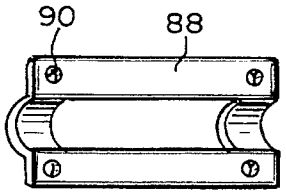


Fig. 10

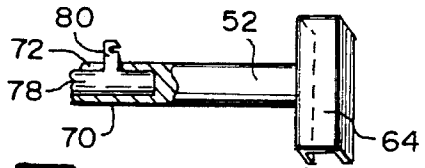


Fig. 11

BATTERY OPERATED NAIL FILE APPARATUS

BACKGROUND OF THE INVENTION

1. Field of the Invention

The instant invention relates generally to nail files and more specifically it relates to a battery operated nail file apparatus.

2. Description of the Prior Art

Numerous nail files have been provided in prior art that are small flat steel tools with hardened ridged surfaces used for smoothing, polishing and sharping the fingernails. While these units may be suitable for the particular purpose to which they address, they would not be as suitable for the purposes of the present invention as heretofore described.

SUMMARY OF THE INVENTION

A primary object of the present invention is to provide a battery operated nail file apparatus that will overcome the shortcomings of the prior art devices.

Another object is to provide a battery operated nail file apparatus that will produce even strokes for a more effective filing of the fingernails and will perform the task in less time, while require less effort than the traditional filing method.

An additional object is to provide a battery operated nail file apparatus in which the components will be made out of lightweight and durable materials.

A further object is to provide a battery operated nail file apparatus that is simple and easy to use.

A still further object is to provide a battery operated nail file apparatus that is economical in cost to manufacture.

Further objects of the invention will appear as the description proceeds.

To the accomplishment of the above and related objects, this invention may be embodied in the form illustrated in the accompanying drawings, attention being called to the fact, however, that the drawings are illustrative only, and that changes may be made in the specific construction illustrated and described within the scope of the appended claims.

BRIEF DESCRIPTION OF THE DRAWING FIGURES

FIG. **1** is a front perspective view of the instant invention.

FIG. **2** is a rear exploded perspective view with parts broken away taken in the direction of arrow **2** in FIG. **1**.

FIG. **3** is a front view taken in the direction of arrow **3** in FIG. **1**.

FIG. **4** is a perspective view showing a rear portion of the nail file in phantom ready to be placed upon the forward stationary hooks.

FIG. **5** is a cross sectional view taken along line **5**—**5** in FIG. **1**, showing parts broken away and in phantom.

FIG. **6** is an enlarged view as indicated by arrow **6** in FIG. **5**, showing a portion of the worm gear and the worm in greater detail.

FIG. **7** is an end view of the worm gear taken in the direction of arrow **7** in FIG. **5**, showing the roller exploded from the pin.

FIG. **8** is a side view of the worm gear in phantom taken in the direction of arrow **8** in FIG. **7**.

FIG. **9** is a rear perspective view of the electric motor and motor mount.

FIG. **10** is a side perspective view of the back-up bracket.

FIG. **11** is a side view partly in perspective with parts broken away and in section, showing part of the piston and nail file holder.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Turning now descriptively to the drawings, in which similar reference characters denote similar elements throughout the several views, FIGS. **1** through **11** illustrate a nail file apparatus **12** which comprises a housing **14**, with a handle **16** extending from a rear portion **17** of the housing **14**. A nail file **18** has a tip portion **20**, a heel portion **22** and ridges **24** therebetween. A mechanism **26** within the housing **14** is for causing a reciprocating movement. A structure **28** is for coupling the heel portion **22** of the nail file **18** to the reciprocating movement mechanism **26** at a front portion **30** of the housing **14**. A person can grip the handle **16** and activate the reciprocating movement mechanism **26** to operate the nail file **18** extending therefrom. The ridges **24** will automatically smooth, polish and shape the fingernails.

The handle **16** includes a padded hand grip **32** having an undulating surface, so that it can be grasped securely by the hand of the person. The handle **16** is hollow having a rear open end **34** and includes a padded end cap **36** with a collar **38** that fits into the rear open end **34** of the handle **16**, so as to form a compartment **40** within the handle **16**.

The reciprocating movement mechanism **26** contains an electric motor **42**, with a portable power source **44** electrically connected to the electric motor **42**. A drive shaft **46** extends from the electric motor **42**, while a worm **48** is on the drive shaft **46**. A worm gear **50** engages the worm **48** and a piston **52** is provided. A unit **54** is for pivotally connecting in an offset manner the piston **52** to the worm gear **50**. When the worm gear **50** is turned by the worm **48** on the drive shaft **46** which is rotatable by the electric motor **42**, the piston **52** will move horizontally back and forth. The portable power source **44** is a battery **56**, insertable into the compartment **40** within the handle **16**.

The pivotally connecting unit **54** includes a pin **58** mounted offset to a side **60** of the worm gear **50**. A roller **62** is on the pin **58** rides in follower **64** (see FIG. **11**) mounted to the piston **52**, which engages thereby with the roller **62**.

The coupling structure **28** consists of the housing **14** having a socket **66** formed in the front portion **30** thereof. A nail file holder **68** is integral with a forward end of the piston **52** at the socket **66** in the housing **14**. The heel portion **22** of the nail file **18** can be retained by the nail file holder **68**. The nail file holder **68** contains a hollow shaft **70** having a slot **72** therethrough. A stationary member **74** having a pair of spaced apart upstanding hooks **76** is attached transversely to a forward end of the hollow shaft **70**, with the hooks **76** facing forward.

A movable member **78** **78** has an upstanding hook **80** facing rearward. The movable member **78** rides within the hollow shaft **70** with the upstanding hook **80** through the slot **72**. A spring **82** is carried within the hollow shaft **70** between the stationary member **74** and the movable member **78**, so as to bias the movable member **78** away from the stationary member **74**. The nail file **18** has three apertures **84** through the heel portion **22**. When the heel portion **22** is inserted through the socket **66** in the housing **14**, the hooks **76** on the stationary member **74** and the hook **80** on the movable member **78** will engage with the three apertures **84** in the heel portion **22** of the nail file **18**.

A gear casing **86** is within the housing **14**, for maintaining the drive shaft **46** with the worm **48** and the worm gear **50** in a cooperating condition therein. A back up bracket **88** is for supporting the piston **52** and a rear portion of the hollow shaft **70**. The back up bracket **88** has a plurality of holes **90** therethrough. A plurality of fasteners **92** extend through the holes **90**, for securing the back up bracket **88** within the gear casing **86**. A forward portion of the hollow shaft **70** can extend through the gear casing **86** and into the socket **66** of the housing **14**.

A motor mount **94** is for holding the electric motor **42**. The motor mount **94** has a plurality of bores **96** therethrough. A plurality of bolts **98** are provided to extend through the bores **96**, for securing the motor mount **94** within the housing **14** behind the gear casing **86**. The reciprocating movement mechanism **26** further includes a switch **100** mounted onto the top of the housing **14** adjacent the rear portion **17**, so as to be manually operated to turn the electric motor **42** on and off.

The nail file apparatus **12** is a free standing unit and measures approximately seven and three quarter inches in length and one and three quarter inches in width. The energy will be supplied by the 9-volt battery **56**. The electric motor **42** is approximately one and one half inches by one inch and will run at nineteen hundred RPM. The worm gear **50** contains 20 teeth and will run at ninety five RPM. For those who prefer slower filing motion, the apparatus can be manufactured with the worm gear **50** containing 30 teeth and run at sixty three RPM. The worm gear **50** will interface with the worm gear **48**, whereby each revolution of this gear **48** will move one tooth of the worm gear. The piston is approximately two and three quarter inches in length and one quarter inch in width and will contain the nail file holder **68** in the front portion **30**, which will have the spring **82** measuring approximately one inch in length. The hooks **76** and the other hook **80** will attach to the metal nail file **18**, measuring approximately five inches in length by one half inch in width. The nail file **18** will contain the three apertures **84** to facilitate attachment.

One complete revolution of all of the teeth of the worm gear **50** will cause one back and forth motion of the nail file **18**. The sizes listed above are approximate and not limited to the apparatus **12**.

LIST OF REFERENCE NUMBERS

LIST OF REFERENCE NUMBERS	
12	nail file apparatus
14	housing
16	handle
17	rear portion of 14
18	nail file
20	tip portion of 18
22	heel portion of 18
24	ridges on 18
26	reciprocating movement mechanism
28	coupling structure
30	front portion of 14
32	padded hand grip on 16
34	rear open end of 16
36	padded end cap
38	collar of 36
40	compartment in 16
42	electric motor
44	portable power source
46	drive shaft from 42
48	worm on 46

-continued

LIST OF REFERENCE NUMBERS	
50	worm gear
52	piston
54	pivotally connecting unit
56	battery for 44
58	pin
60	side of 50
62	roller
64	follower on 52
66	socket in 30
68	nail file holder
70	hollow shaft
72	slot in 70
74	stationary member
76	upstanding hook on 74
78	moveable member
80	upstanding hook on 78
82	spring in 70
84	aperture in 22
86	gear casing
88	back up bracket
90	hole in 88
92	fastener
94	motor mount
96	bore
98	bolt
100	switch

It will be understood that each of the elements described above, or two or more together may also find a useful application in other types of methods differing from the type described above.

While certain novel features of this invention have been shown and described and are pointed out in the annexed claims, it is not intended to be limited to the details above, since it will be understood that various omissions, modifications, substitutions and changes in the forms and details of the device illustrated and in its operation can be made by those skilled in the art without departing in any way from the spirit of the present invention.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can, by applying current knowledge, readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention.

What is claimed is new and desired to be protected by Letters Patent is set forth in the appended claims:

1. A nail file apparatus which comprises:

a) a housing;

b) a handle extending from a rear portion of said housing including a padded hand grip having an undulating surface, so that it can be grasped securely by the hand of the person, said handle being hollow, having a rear open end and includes a padded end cap with a collar that fits into the rear open end of said handle, so as to form a compartment within said handle;

c) a nail file having a tip portion, a heel portion and ridges therebetween;

d) means within said housing, for causing a reciprocating movement including an electric motor, a portable power source comprising a battery inserted into the compartment within said handle electrically connected to said electric motor, a drive shaft extending from said electric motor, a worm on said drive shaft, a worm gear engaging with said worm, a piston, and means for pivotally connecting in an offset manner, said piston to

said worm gear, so that when said worm gear is turned by said worm on said drive shaft which is rotatable by said electric motor, said piston will move horizontally back and forth, said pivotally connecting means including a pin mounted offset to a side of said worm gear, a roller on said pin, and a follower mounted to said piston which engages said roller;

e) means for coupling the heel portion of said nail file to said reciprocating movement means at a front portion of said housing so as to support said nail file at one end only, so that a person can grip said handle and activate said reciprocating movement means to operate said nail file extending therefrom, in which the ridges will automatically smooth, polish and shape fingernails, said coupling means including said housing having a socket formed in the front portion thereof, and a nail file holder integral with a forward end of said piston at said socket in said housing, so that the heel portion of said nail file can be retained by said nail file holder; and

f) said nail file holder including a hollow shaft having a slot therethrough, a first member having a pair of spaced apart upstanding hooks attached transversely to a forward end of said hollow shaft, said hooks facing forward, a member movable with respect to said hollow shaft having an upstanding hook facing rearwardly, said movable member riding within said hollow shaft with said upstanding hook through said slot, a spring carried within said hollow shaft between said first member and said movable member, so as to bias said movable member away from said stationary member, and said nail file having three apertures through the heel portion, so that when the heel portion is inserted through said socket in said housing, the hooks on said stationary member and the hook on said movable member will engage with said three apertures in the heel portion of said nail file, and a back up bracket for supporting said piston and a rear portion of said hollow shaft, said back up bracket having a plurality of holes therethrough, and a plurality of fasteners to extend through said holes for securing said back up bracket within said gear casing, so that a forward portion of said hollow shaft can extend through said gear casing and into said socket of said housing, said nail file projecting from said apparatus being supported only at the heel portion thereof.

* * * * *