May 27, 1958 C. S. LACSON 2,835,957

PNEUMATIC POWER FILE

Filed Nov. 9, 1956 2 Sheets-Sheet 1

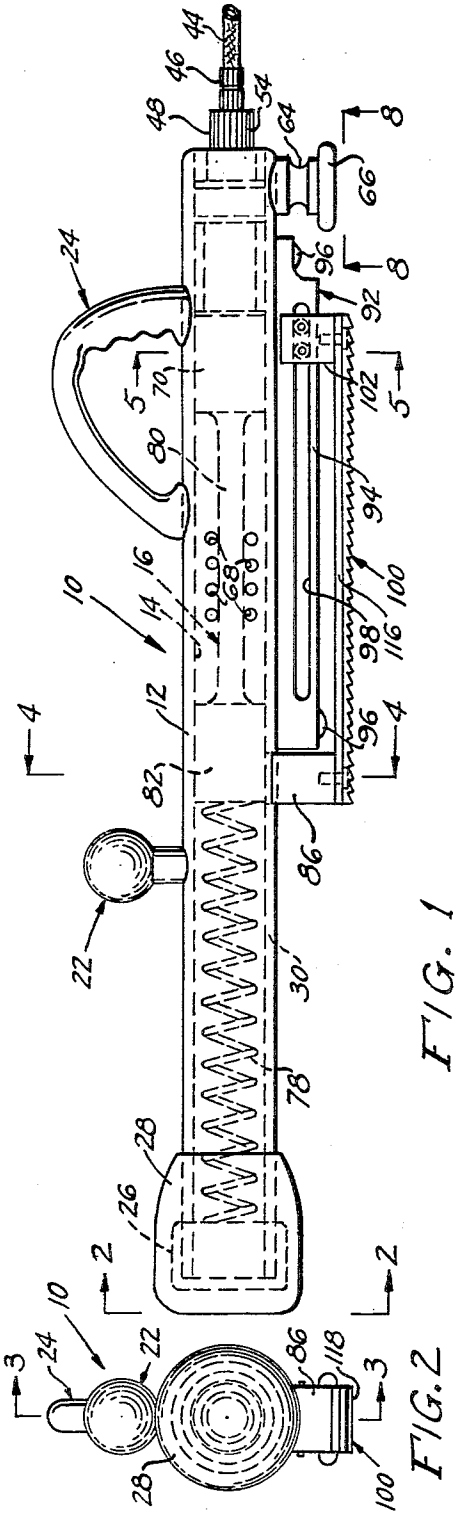


FIG. 1

FIG. 2

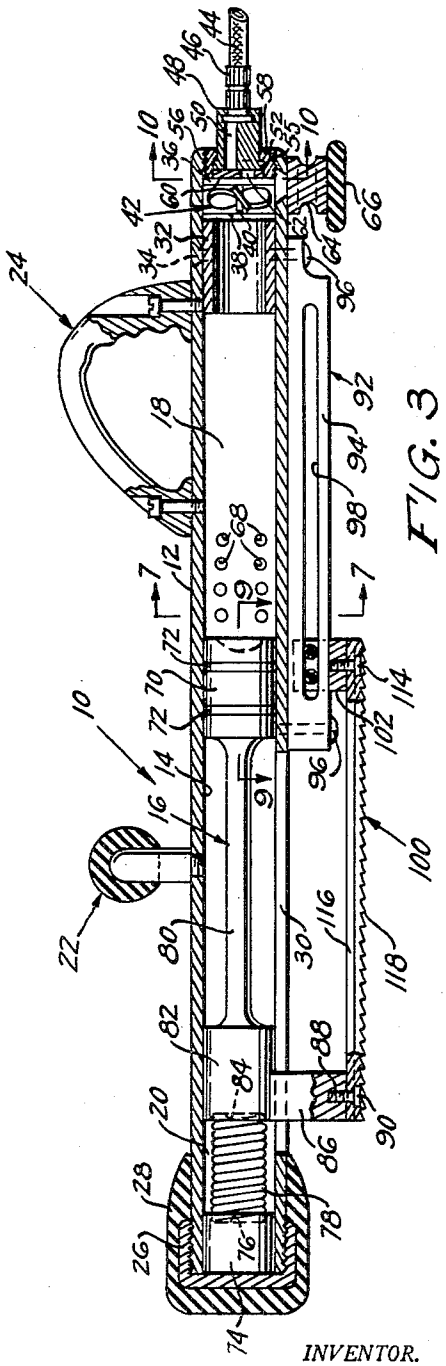


FIG. 3

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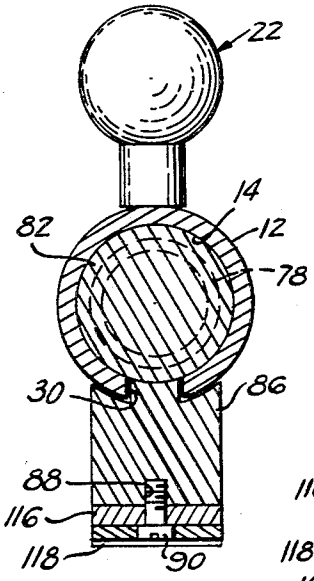


FIG. 4

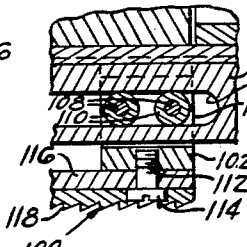


FIG. 6

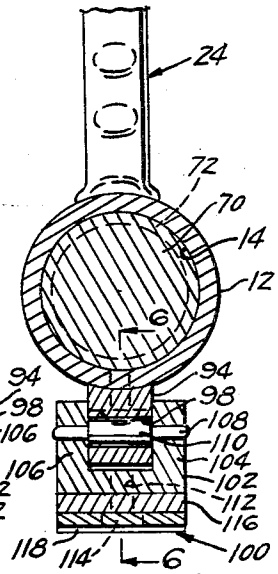


FIG. 5

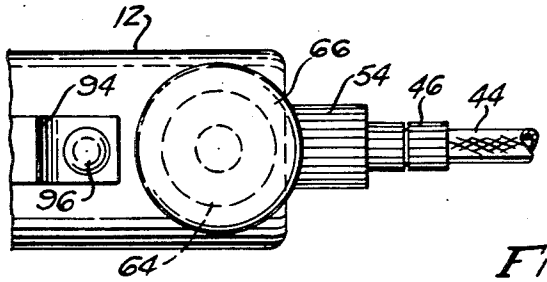


FIG. 8

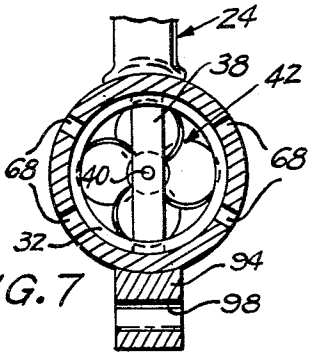


FIG. 7

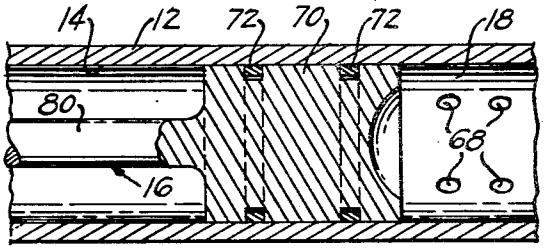


FIG. 9

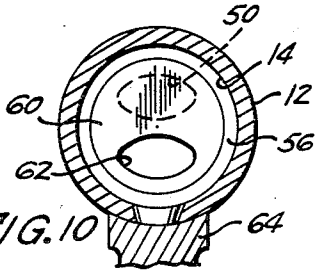


FIG. 10

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United States Patent Office

2,835,957

Patented May 27, 1958

2,835,957

PNEUMATIC POWER FILE

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Application November 9, 1956, Serial No. 621,431

5 Claims. (Cl. 29—76)

This invention relates generally to hand tools and is more particularly concerned with a pneumatically operated hand-manipulable power file.

When doing body work on an automotive vehicle, for example, one of the tedious and time-consuming operations involved therein is utilizing a file or rasp for the purpose of obtaining a suitable contour on a previously leaded deformation in the surface of the body of the vehicle. Accordingly, by virtue of the amount of work involved in this procedure, employees are difficult to obtain to perform this task and the excessive amount of time consumed in performing the same appreciably increases the cost to the employer. Accordingly, it is highly desirable to utilize a power-operated file for this task affording a more uniform completed job and eliminating fatigue of a person performing the task as well as appreciably reducing the amount of time involved.

The primary object of invention is to provide a novel pneumatic power file for use in body work or the like on an automotive vehicle, for example, said power file incorporating novel cooperating means, being readily and economically manufactured, easily used and maintained, and highly satisfactory, practical as well as acceptable for the purpose intended.

These together with other objects and advantages which will subsequently become apparent reside in the details of construction and operation is more fully hereinafter described and claimed, reference being had to the accompanying drawing forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

Figure 1 is a side elevational view of the novel pneumatic power file;

Figure 2 is an end elevational view looking substantially from line 2—2 of Figure 1;

Figure 3 is a vertical section view taken substantially on line 3—3 of Figure 2, portions being broken away and shown in section for clarity;

Figure 4 is an enlarged vertical sectional view taken substantially on line 4—4 of Figure 1;

Figure 5 is an enlarged vertical section view taken substantially on line 5—5 of Figure 1;

Figure 6 is a fragmentary vertical section view taken substantially on line 6—6 of Figure 5;

Figure 7 is an enlarged vertical section view taken substantially on line 7—7 of Figure 3;

Figure 8 is a fragmentary enlarged bottom plan view looking substantially from line 8—8 of Figure 1;

Figure 9 is an enlarged fragmentary section view taken substantially on line 9—9 of Figure 3; and

Figure 10 is an enlarged fragmentary section view taken substantially on line 10—10 of Figure 3.

Referring to the drawing in detail, the novel pneumatic power file of the present invention is indicated generally at 10, said tool including an elongated barrel 12 incorporating a longitudinally extending bore portion 14 reciprocably supporting therein a piston assembly indicated generally at 16 defining in said barrel a pair of oppositely

disposed variable volume chambers 18 and 20, the chamber 18 being identified as the rear or compression chamber and the chamber 20 being identified as the forward chamber.

Suitably secured in laterally extending relationship from the outer periphery of the barrel 12 is an intermediate knob or handle 22, of any suitable character, to be grasped in one hand of a user of the tool. In longitudinally spaced alignment rearwardly of the handle 22 is a second suitable handle indicated generally at 24 to be grasped by the other hand of a user of the tool, said handles being disposed in substantially planar alignment and defining the top of the tool.

The handles as illustrated in the exemplary embodiment substantially conform to those utilized on a conventional file or rasp utilized in vehicle body work.

The barrel 12 incorporates on the outer periphery of its forward end a threaded portion for receiving therein a suitable sealing cap 26 closing the forward end of said barrel. Circumposed in any suitable secured relationship about the cap 26 is a suitable bumper element 28 preventing accidental damage to a vehicle body being worked on, for example. Extending substantially half the length of the barrel 12 diametrically opposed relative to the handles 22 and 24 is an elongated longitudinal slot 30 which communicates with the variable volume chamber 20 as clearly seen in Figure 3.

Suitably secured about the inner periphery of barrel 12 in spaced relation from the rear end thereof is a tubular spacer sleeve 32 being retained in a substantially fixed position by means of a suitable screw 34, for example. Disposed rearwardly of the sleeve 32 in diametrically extending suitably secured longitudinally spaced relationship are a pair of diametrical support elements 36 and 38 which have extending therebetween suitably secured a support shaft 40 which is in axial alignment with the longitudinal axis of the barrel 12. Journaled on the shaft 40 is a suitable impeller blade assembly indicated generally at 42 which prevents sudden surges of pneumatic pressure from a suitable pressure source, not shown, in communication with a flexible conduit 44. The conduit 44 has fixedly secured on one end thereof a suitable coupling element 46 connected to a nipple element 48 incorporating a longitudinally extending offset bore portion 50 therethrough. The nipple element 48 terminates at its opposite end in an annular flange portion 52 and incorporates on the outer periphery thereof longitudinally extending ribs or serrations 54, see Figure 8, for facilitating the rotation thereof, this providing means for controlling the amount of pneumatic pressure to be imposed or directed into the variable volume chamber 18. The rear end of the barrel 12 incorporates an internally threaded portion 55 receiving therein a suitable mounting nut 56 incorporating a collar portion 58 engageable with the annular flange 52. Extending transversely of the nut 56 on the inner periphery thereof in juxtaposition between the support element 36 and the end portion of the nipple element 48 is a metering disc 60 incorporating a transverse offset bore portion 62 therethrough which may be in a total or partial alignment with the bore 50 previously mentioned, see Figure 10, and accordingly controlling the communication between a pneumatic pressure source and the variable volume chamber 18.

Suitably secured in depending relationship diametrically opposed to the handles 22 and 24 at the rear bottom end of the barrel 12 is a support element 64 incorporating thereon a suitable bumper portion 66 of any suitable resilient material, this also preventing accidental metal-to-metal contact between the portion of a vehicle body being worked on and the power file.

Extending through a predetermined intermediate por-

tion of the barrel 12 for communicating the rear chamber 18 with the atmosphere, are a plurality of radially disposed bore portions or passage portions 68, providing means for relieving pressure in the variable volume chamber 18 as the piston assembly 16 moves toward the forward closed end of the barrel 12 after pressure has built up in the variable volume chamber 18.

The piston assembly 16 incorporates a cylindrical piston 70 incorporating thereabout in annular grooves circumposed suitable piston rings 72, said piston rings sealing chamber 18 from chamber 20. Thus, when the piston assembly 16 is disposed in the dotted line postion shown in Figure 1, pressure will build up in the variable volume chamber 18 urging said piston assembly forwardly toward the position shown by the solid lines in Figure 3, movement of the piston 70 beyond the passages 68 resulting in relief of pressure in the variable volume chamber 18. This is considered the forward stroke of the power file. Disposed in the variable volume chamber 20 in suitably secured relationship adjacent the transverse end of cap element 26 is an abutment element 74 incorporating a recess 76 in the end thereof facing the piston assembly 16, receiving therein one end of a compression spring 78 which will be compressed due to the forward movement of the piston assembly 16 and accordingly store up energy for returning the piston assembly 16 to the dotted line position shown in Figure 1 for a subsequent rectilinear movement, the compression spring 78 being effective to cause a return stroke for the power file. The piston 70 incorporates a longitudinally extending integral connecting rod 80 terminating in an integral annular guide element 82 incorporating a recess portion 84 in the end thereof facing the recess 76 for receiving the opposite end of the compression spring 78 therein. Formed integral with the guide element 82 and extending laterally therefrom is a suitably conformed guide portion 86, see Figure 4, incorporating an internally threaded bore portion 88 in the lower end thereof for receiving therein suitable fastening screws 90 for a purpose to subsequently be described in detail.

Indicated generally at 92 is guide means comprising an elongated support member 94 apertured at opposite ends for receiving fastening elements 96 therethrough which are engageable in suitable tapped portions in the barrel 12. The support member 94 is in longitudinal alignment with the slot 30 of the barrel 12 disposed beneath substantially one half of the rear end portion of said barrel. Extending transversely through the support member 94 and normal to the longitudinal axis of the barrel 12 is an elongated slot portion 98.

An elongated file carriage assembly is indicated generally at 100 including a channel-shaped guide block 102 having leg portions 104 and 106 disposed on opposite sides of the support member 94, see Figure 5, said legs 104 and 106 incorporating suitable aligned apertured portions a support shaft 108 having journaled thereon a suitable roller bearing element 110 disposed within the slot 98 of the support member 94. The guide block 102 has extending through a suitable internally threaded bore 112 in the bottom thereof a retaining screw 114 similar to the screw 90, see Figure 6, for example. An elongated support plate 116 is transversely apertured at opposite ends permitting the screws 90 and 114 to lockingly engage the same on portion 86 of the guide element 82 and on the lower surface of the guide block 102. A suitable rasp or file which is interchangeable, is indicated at 118 and is secured in downwardly facing relationship on the lower surface of the support bar or plate 116.

Thus as the piston assembly 16 is moved on its forward and rearward stroke as previously described, the file or rasp 118 will be moved in a rectilinear path of reciprocatory movement in a manner readily apparent.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the appended claims.

What is claimed is:

1. A pneumatically operated power file comprising an elongated tubular barrel including an internal longitudinal bore, longitudinally spaced handle means extending laterally from one side of the barrel to be grasped in the hands of a person using the file, a reciprocatory piston assembly in the bore defining forward and rear variable volume chambers in the barrel, said barrel including a closed forward end, compression spring means in the forward variable volume chamber between said forward end of the barrel and said piston assembly for storing energy due to longitudinal forward movement of said piston assembly, a pneumatic pressure line connection in communication with the rear variable volume chamber, means on said pressure line connection for controlling the entrance of pneumatic pressure into the rear chamber, pressure-relief passage means extending transversely through, an intermediate portion of the barrel for exteriorly relieving pneumatic pressure on the piston assembly as it is urged forward past the passage means, a longitudinally extending slot in said barrel, guide track means extending longitudinally on the outer surface of the barrel in longitudinal alignment with the slot, and an elongated file-carriage assembly including means on one end slidingly received on the guide track means and means on the other end extending through said slot and operatively connected to the piston assembly whereby the piston assembly and file-carriage are simultaneously reciprocated rectilinearly due to pneumatic pressure and said compression spring means, said guide track means comprising an elongated support secured longitudinally on the outer surface of the barrel, a longitudinally extending slot extending transversely through the support in spaced normal relationship relative to the longitudinal axis of the barrel, the means on the one end of the file-carriage comprising roller bearings disposed transversely in the last-mentioned longitudinally extending slot.

2. A pneumatically operated power file comprising an elongated tubular barrel including an internal longitudinal bore, longitudinally spaced handle means extending laterally from one side of the barrel to be grasped in the hands of a person using the file, a reciprocatory piston assembly in the bore defining forward and rear variable volume chambers in the barrel, said barrel including a closed forward end, compression spring means in the forward variable volume chamber between said forward end of the barrel and said piston assembly for storing energy due to longitudinal forward movement of said piston assembly, a pneumatic pressure line connection in communication with the rear variable volume chamber, means on said pressure line connection for controlling the entrance of pneumatic pressure into the rear chamber, pressure-relief passage means extending transversely through an intermediate portion of the barrel for exteriorly relieving pneumatic pressure on the piston assembly as it is urged forward past the passage means, a longitudinally extending slot in said barrel, guide track means extending longitudinally on the outer surface of the barrel in longitudinal alignment with the slot, and an elongated file-carriage assembly including means on one end slidingly received on the guide track means and means on the other end extending through said slot and operatively connected to the piston assembly whereby the piston assembly and file-carriage are simultaneously reciprocated rectilinearly due to pneumatic pressure and said compression spring means, said guide track means comprising an elongated support secured longitudinally on the outer surface of the barrel, a longi-

tudinally extending slot extending transversely through the support in spaced normal relationship relative to the longitudinal axis of the barrel, the means on the one end of the file-carriage comprising roller bearings disposed transversely in the last-mentioned longitudinally extending slot, the barrel including a resilient bumper cap circumposed about the forward end thereof, and a laterally extending resilient bumper element on the rear end of said barrel in spaced planar alignment with said file-carriage assembly.

3. A pneumatically operated power file comprising an elongated tubular barrel including an internal longitudinal bore, longitudinally spaced handle means extending laterally from one side of the barrel to be grasped in the hands of a person using the file, a reciprocatory piston assembly in the bore defining forward and rear variable volume chambers in the barrel, said barrel including a closed forward end, compression spring means in the forward variable volume chamber, between said forward end of the barrel and said piston assembly for storing energy due to longitudinal forward movement of said piston assembly, a pneumatic pressure line connection in communication with the rear variable volume chamber, means on said pressure line connection for controlling the entrance of pneumatic pressure into the rear chamber, pressure-relief passage means extending transversely through an intermediate portion of the barrel for exteriorly relieving pneumatic pressure on the piston assembly as it is urged forward past the passage means, a longitudinally extending slot in said barrel, guide track means extending longitudinally on the outer surface of the barrel in longitudinal alignment with the slot, and an elongated file-carriage assembly including means on one end slidingly received on the guide track means and means on the other end extending through said slot and operatively connected to the piston assembly whereby the piston assembly and file-carriage are simultaneously reciprocated rectilinearly due to the pneumatic pressure and said compression spring means, said piston assembly comprising a rear piston sealingly engaging the inner periphery of the bore preventing communication between the variable volume chambers, a connecting rod extending longitudinally from the piston, a guide element secured on the connecting rod in spaced longitudinal relationship from the piston, said guide element including an integral laterally extending portion normal to the longitudinal axis of the guide element and extending through the slot in the barrel, the other end of the file-carriage assembly being secured to the laterally extending portion of the guide element, said guide track means comprising an elongated support secured longitudinally on the outer surface of the barrel, a longitudinally extending slot extending transversely through the support in spaced normal relationship relative to the longitudinal axis of the barrel, the means on the one end of the file-carriage comprising roller bearings disposed transversely in the last-mentioned longitudinally extending slot.

4. A pneumatically operated power file comprising an elongated tubular barrel including an internal longitudinal bore, longitudinally spaced handle means extending laterally from one side of the barrel to be grasped in the hands of a person using the file, a reciprocatory piston assembly in the bore defining forward and rear variable volume chambers in the barrel, said barrel including a closed forward end, compression spring means in the forward variable volume chamber, between said forward end of the barrel and said piston assembly for storing energy due to longitudinal forward movement of said piston assembly, a pneumatic pressure line connection in communication with the rear variable volume chamber, means on said pressure line connection for controlling the entrance of pneumatic pressure into the rear chamber, pressure-relief passage means extending transversely through an intermediate portion of the barrel for exteriorly relieving pneumatic pressure on the piston assembly as it is urged forward past the passage means, a longitudinally extending slot in said barrel, guide track means extending longitudinally on the outer surface of the barrel in longitudinal alignment with the slot, and an elongated file-carriage assembly including means on one end slidingly received on the guide track means and means on the other end extending through said slot and operatively connected to the piston assembly whereby the piston assembly and file-carriage are simultaneously reciprocated rectilinearly due to the pneumatic pressure on said compression spring means, said piston assembly comprising a rear piston sealingly engaging the inner periphery of the bore preventing communication between the variable volume chambers, a connecting rod extending longitudinally from the piston, a guide element secured on the connecting rod in spaced longitudinal relationship from the piston, said guide element including an integral laterally extending portion normal to the longitudinal axis of the guide element and extending through the slot in the barrel, the other end of the file-carriage assembly being secured to the laterally extending portion of the guide element, the barrel including a resilient bumper cap circumposed about the forward end thereof, and a laterally extending resilient bumper element on the rear end of said barrel in spaced planar alignment with said file-carriage assembly.

5. A pneumatically operated power file comprising an elongated tubular barrel including an internal longitudinal bore, longitudinally spaced handle means extending laterally from one side of the barrel to be grasped in the hands of a person using the file, a reciprocatory piston assembly in the bore defining forward and rear variable volume chambers in the barrel, said barrel including a closed forward end, compression spring means in the forward variable volume chamber, between said forward end of the barrel and said piston assembly for storing energy due to longitudinal forward movement of said piston assembly, a pneumatic pressure line connection in communication with the rear variable volume chamber, means on said pressure line connection for controlling the entrance of pneumatic pressure into the rear chamber, pressure-relief passage means extending transversely through an intermediate portion of the barrel for exteriorly relieving pneumatic pressure on the piston assembly as it is urged forward past the passage means, a longitudinally extending slot in said barrel, guide track means extending longitudinally on the outer surface of the barrel in longitudinal alignment with the slot, and an elongated file-carriage assembly including means on one end slidingly received on the guide track means and means on the other end extending through said slot and operatively connected to the piston assembly whereby the piston assembly and file-carriage are simultaneously reciprocated rectilinearly due to the pneumatic pressure on said compression spring means, said piston assembly comprising a rear piston sealingly engaging the inner periphery of the bore preventing communication between the variable volume chambers, a connecting rod extending longitudinally from the piston, a guide element secured on the connecting rod in spaced longitudinal relationship from the piston, said guide element including an integral laterally extending portion normal to the longitudinal axis of the guide element and extending through the slot in the barrel, the other end of the file-carriage assembly being secured to the laterally extending portion of the guide element, the barrel including a resilient bumper cap circumposed about the forward end thereof, and a laterally extending resilient bumper element on the rear end of said barrel in spaced planar alignment with said file-carriage assembly, said guide track means comprising an elongated support secured longitudinally on the outer surface of the barrel, a longitudinally extending slot extending transversely through the support in spaced normal relationship relative to the longitudinal axis of the barrel, the means on the one

end of the file-carriage comprising roller bearings disposed transversely in the last-mentioned longitudinally extending slot.

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