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(54) **ASSEMBLY AND NOISE SUPPRESSOR FOR FIREARMS**

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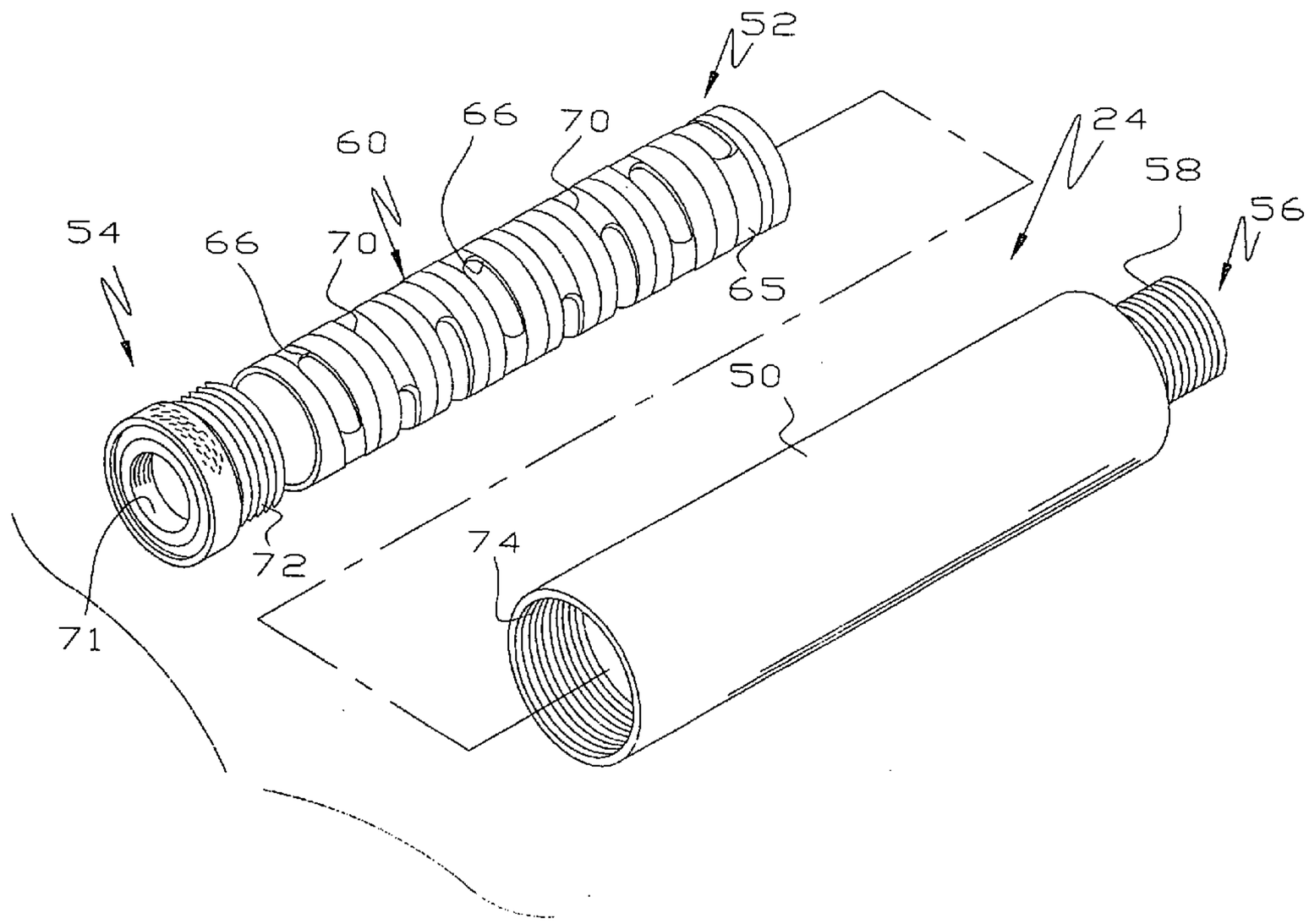
(57) **ABSTRACT**

An assembly for a firearm (**10**) includes a sleeve (**22**) connected to the receiver or receiver end of the barrel (**18**). The sleeve (**22**) extends beyond the discharge end of the barrel (**18**) and includes inwardly extending projections (**42**) abutting or juxtaposed to a peripheral section (**44**) of the discharge end of the barrel (**18**). A noise suppressor (**24**, **50**) threads onto the sleeve (**22**). Some of the propellant gases are redirected and cooled by the noise suppressor (**24**, **50**) in a conventional manner. Some of the propellant gases are redirected into an annulus (**46**) between the barrel (**18**) and sleeve (**22**) where they are cooled and some of their volume is reduced thereby increasing the efficiency of the noise suppressor (**24**, **50**).



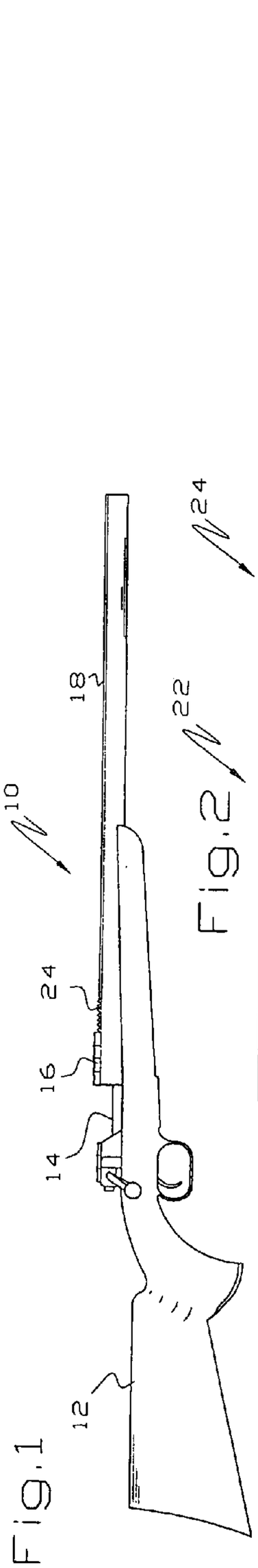


Fig.1

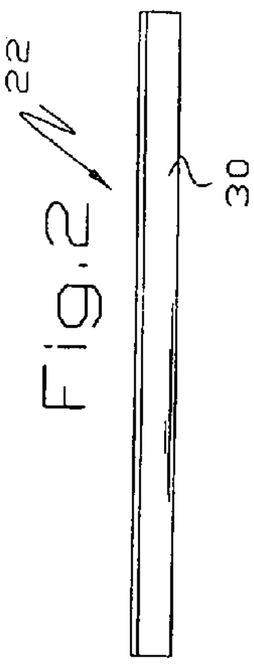


Fig.2

Fig.3

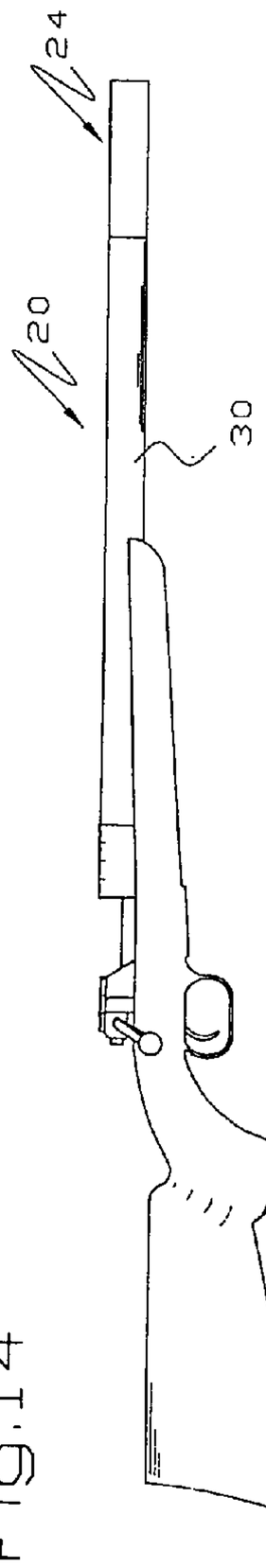


Fig.14

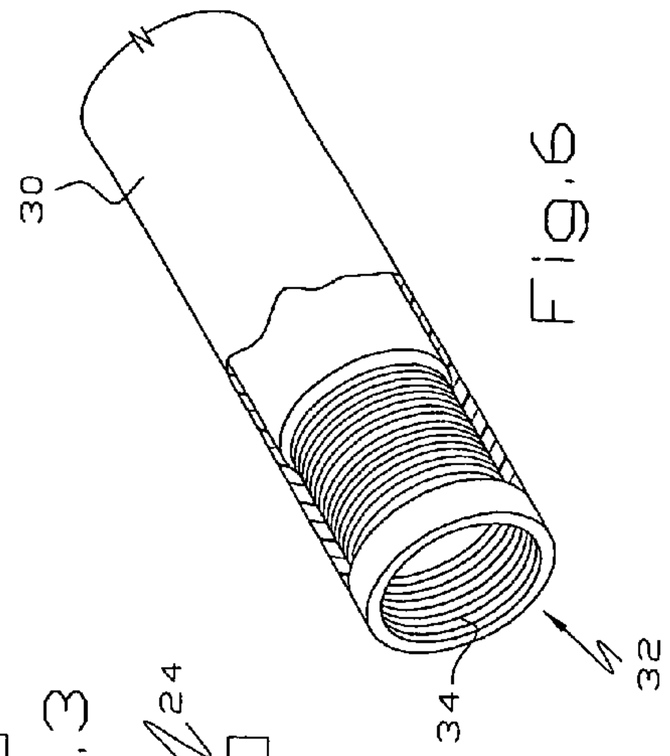


Fig.6

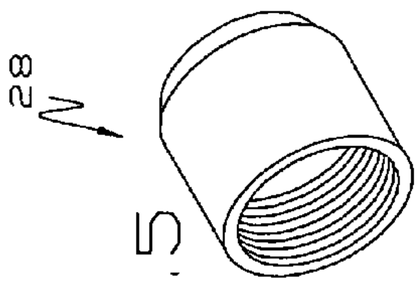


Fig.5

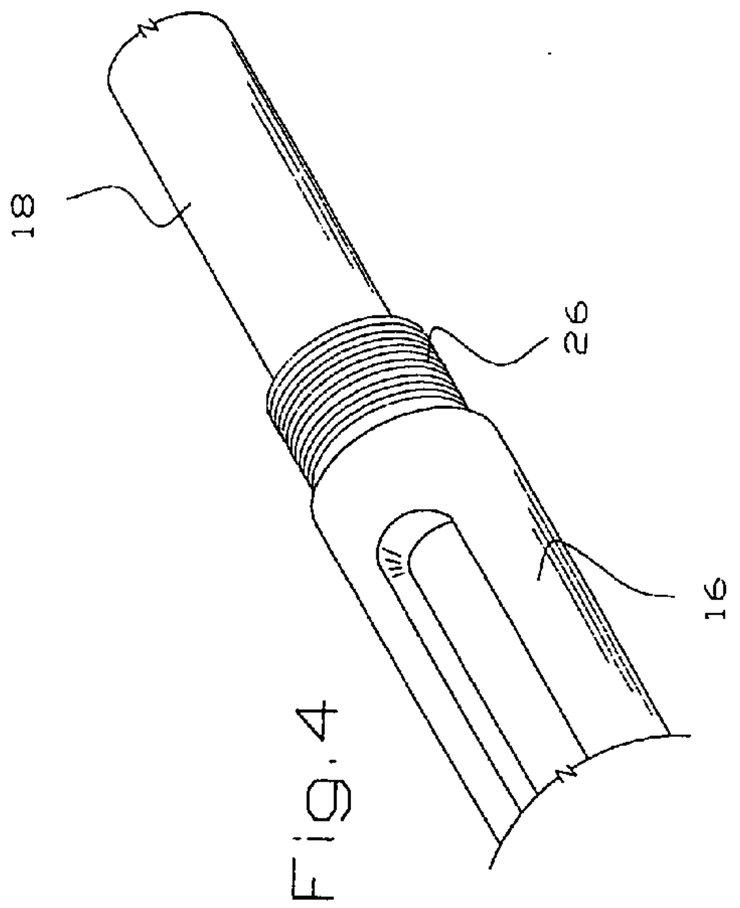


Fig.4

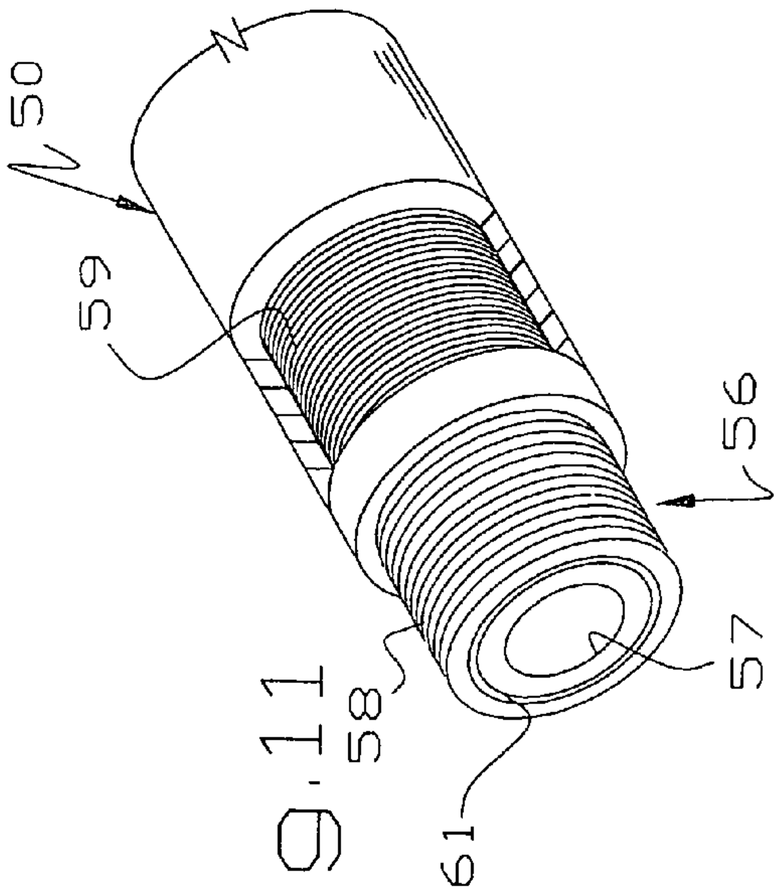
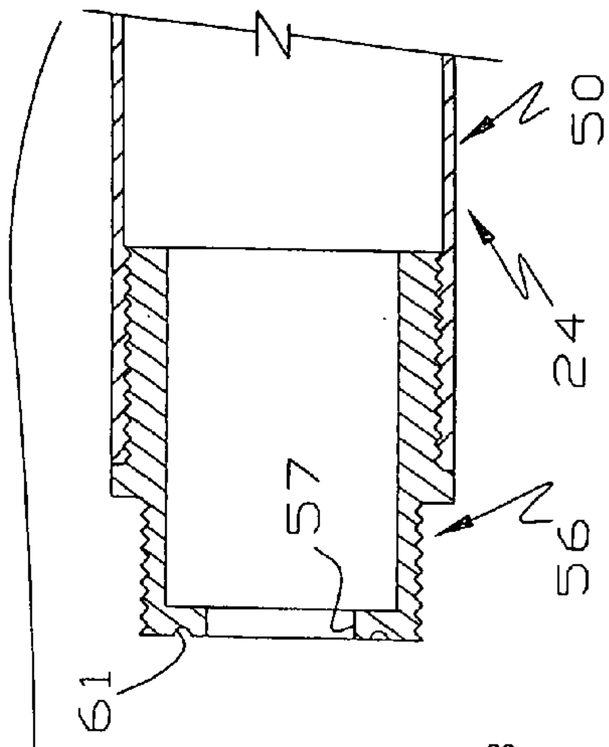


Fig.11



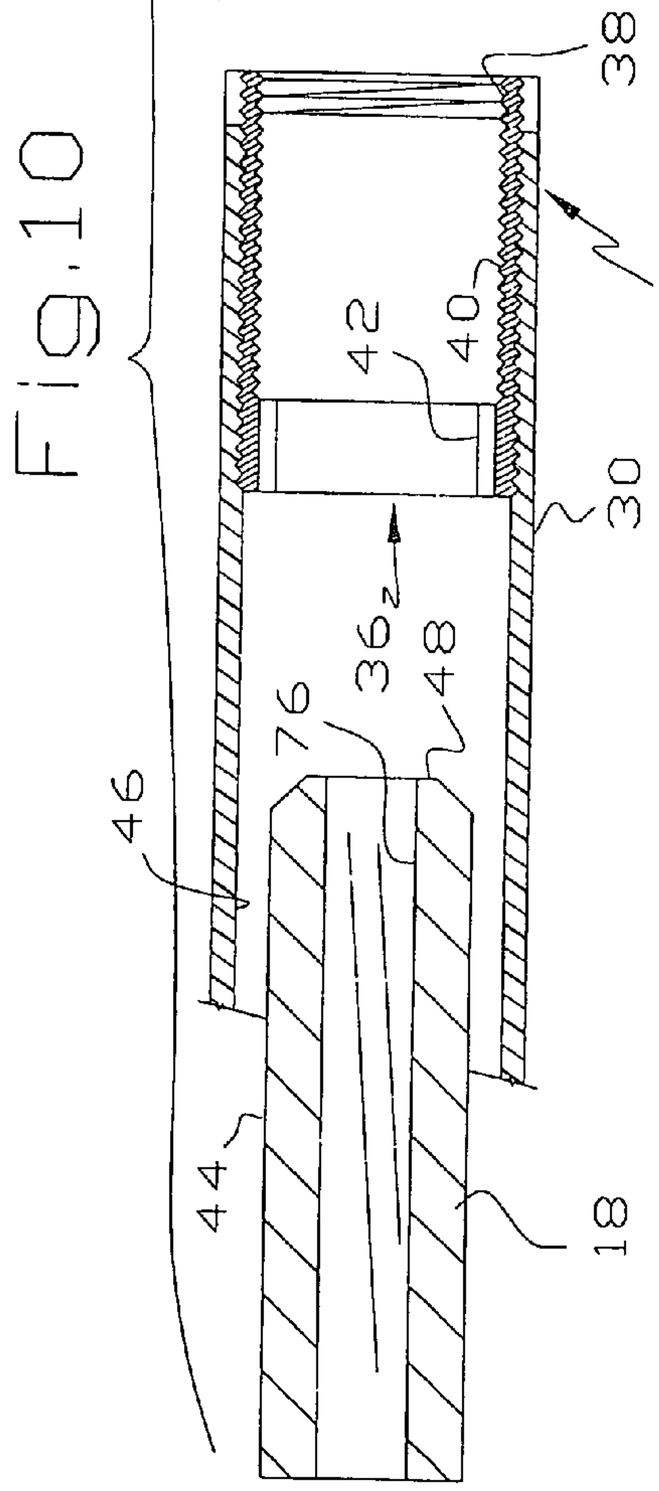


Fig.10

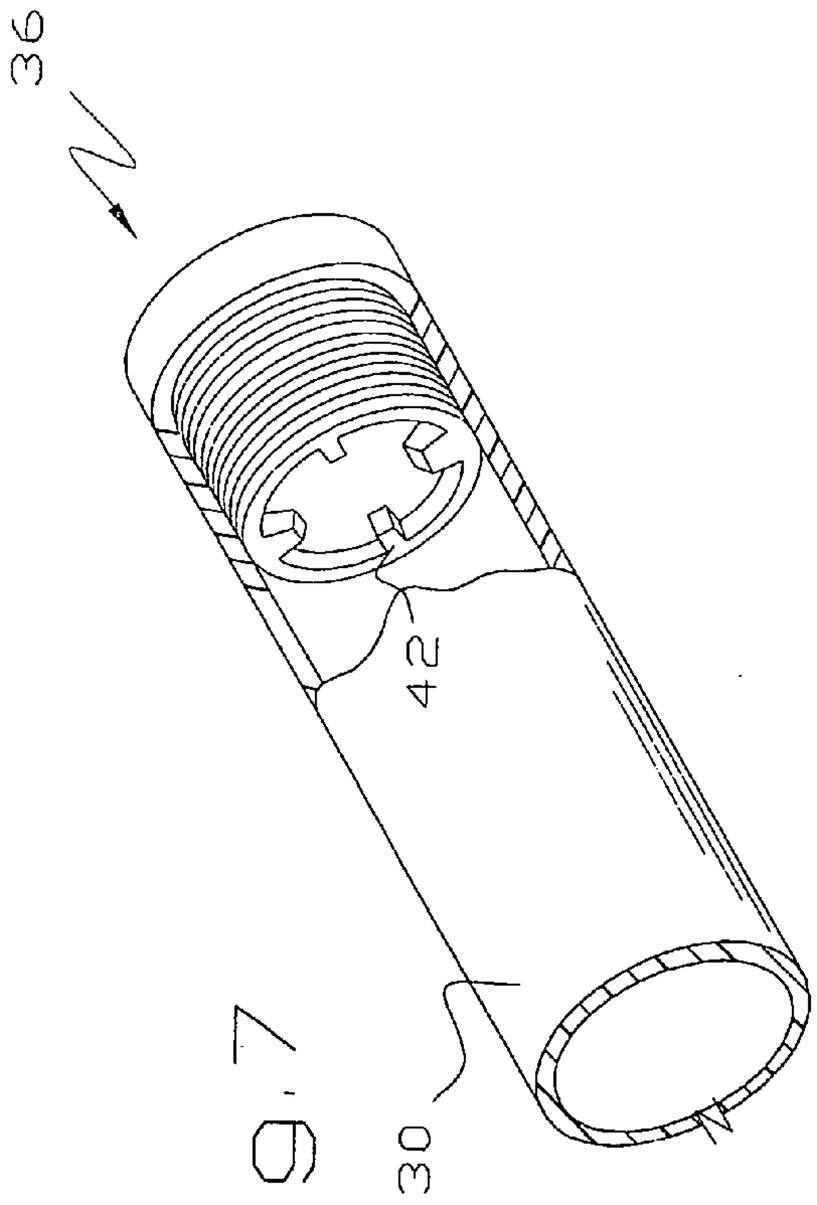


Fig.7

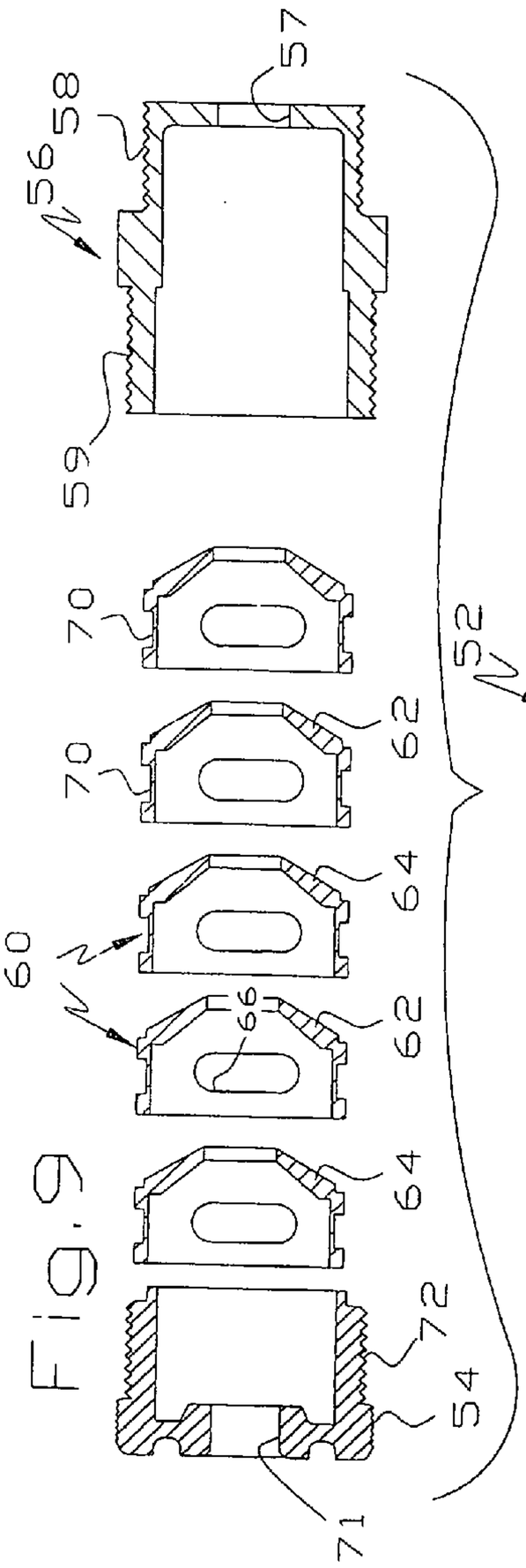

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Fig. 9

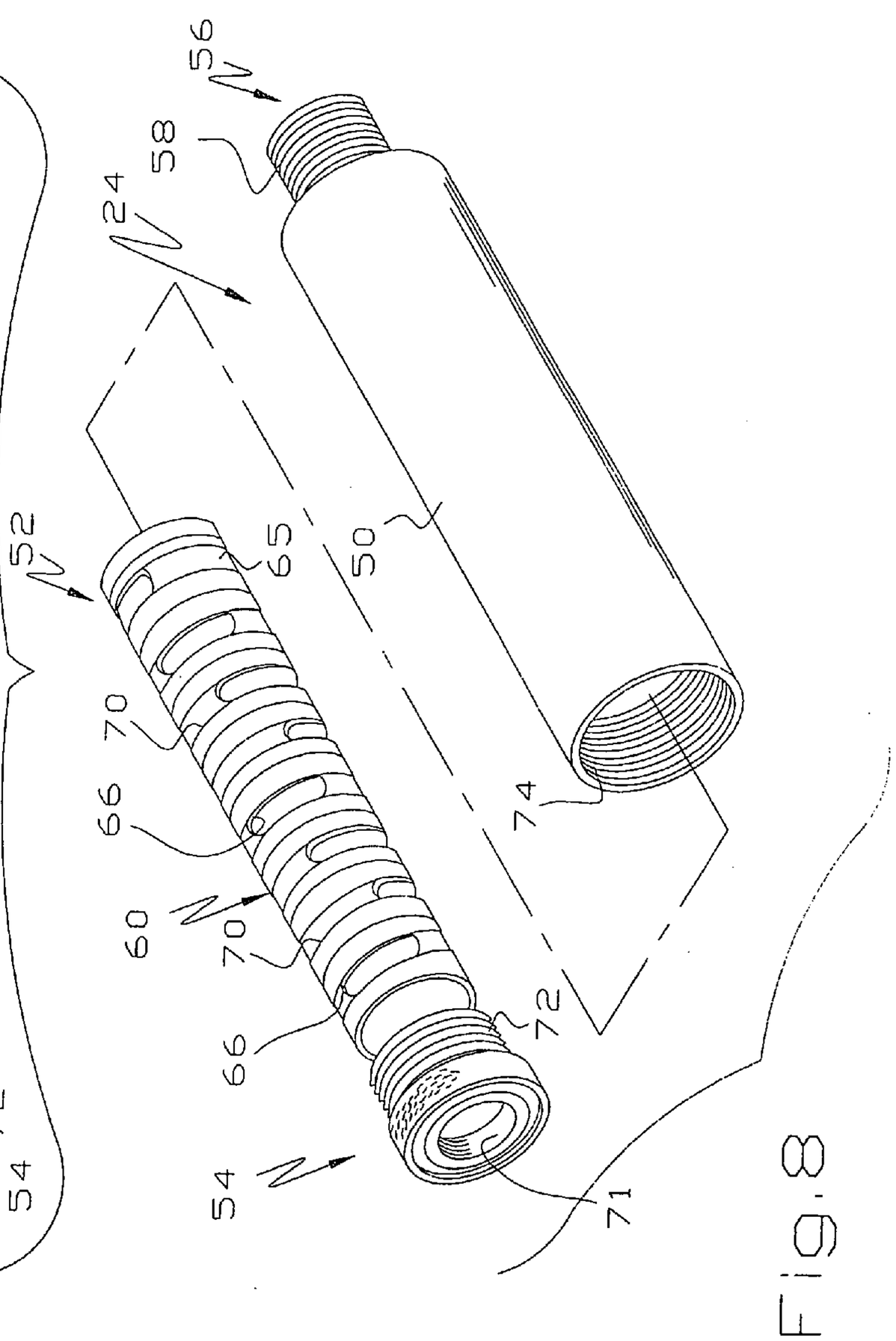
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Fig. 8

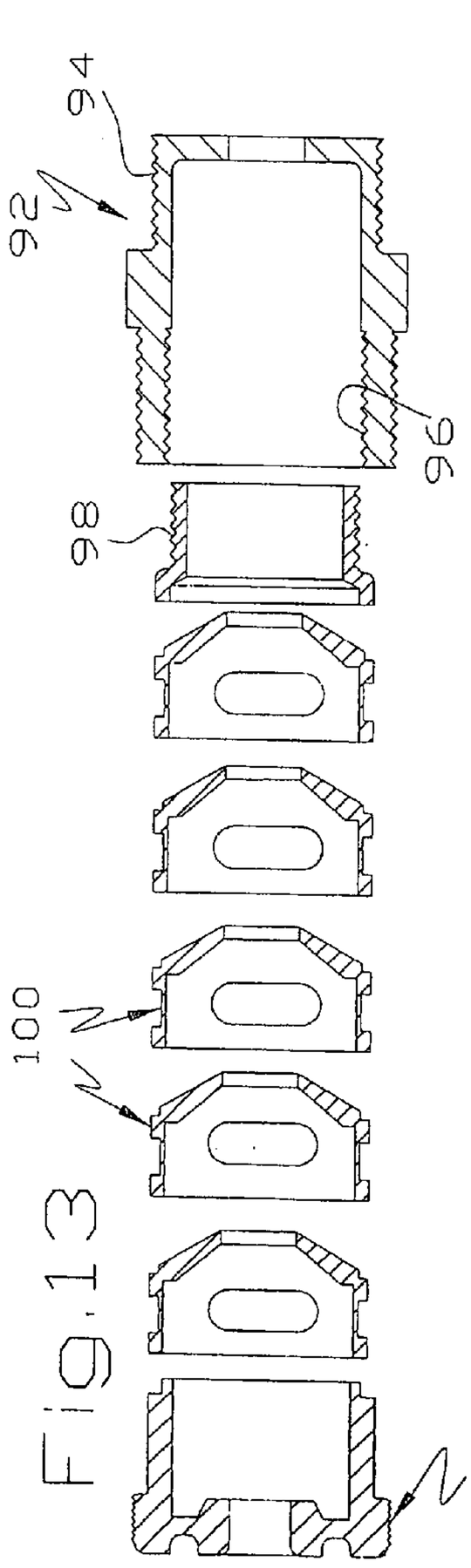

Fig.13

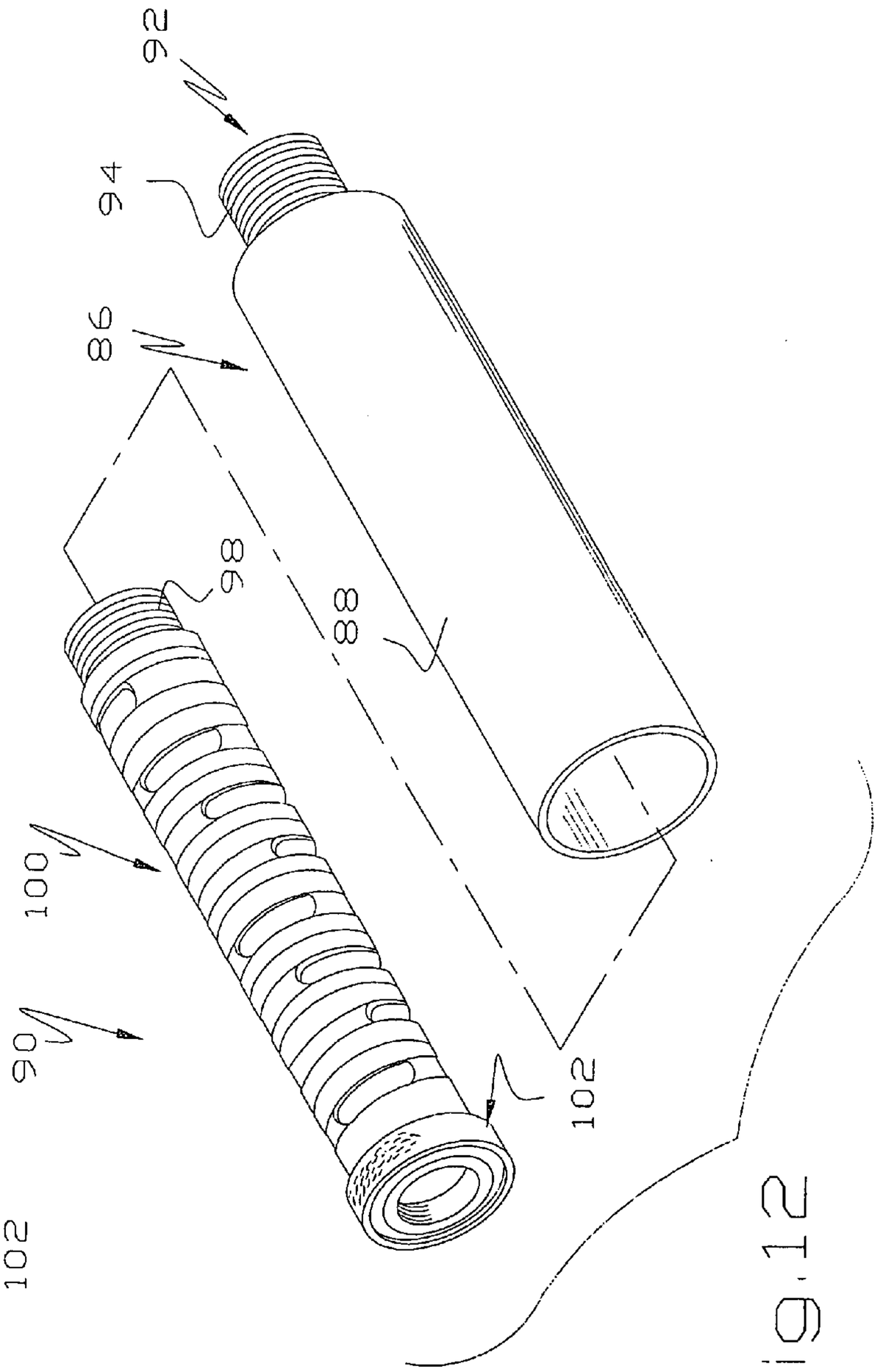

Fig.12

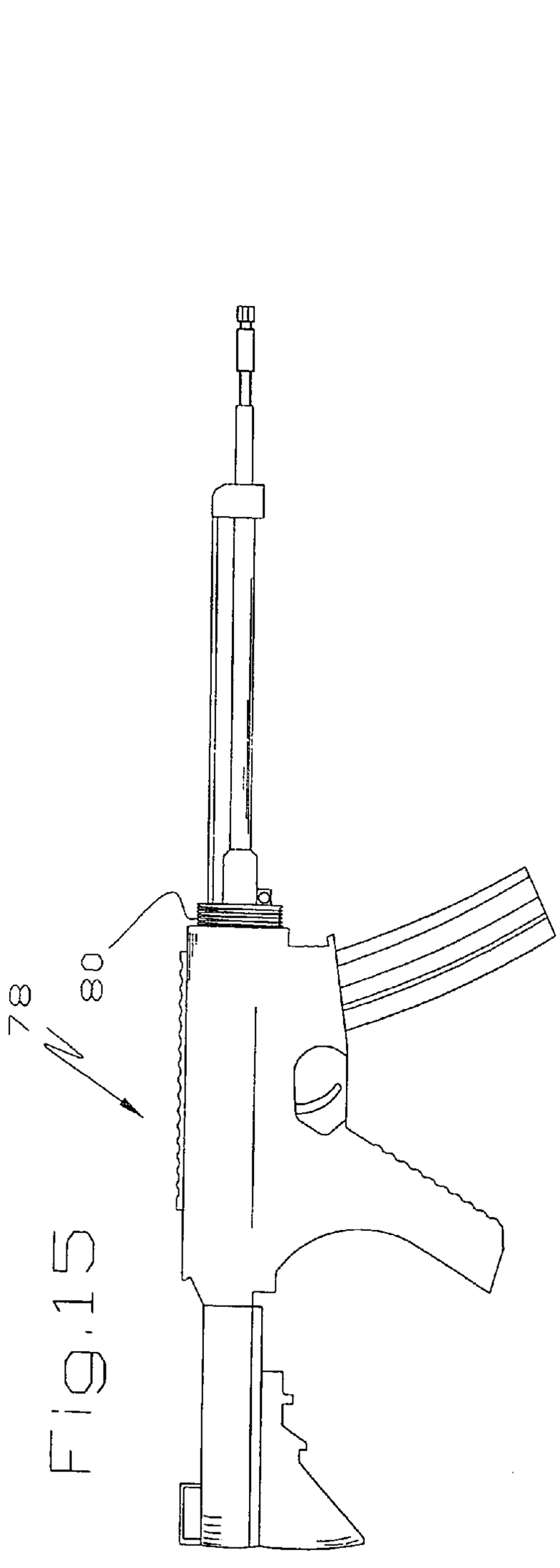

Fig.15

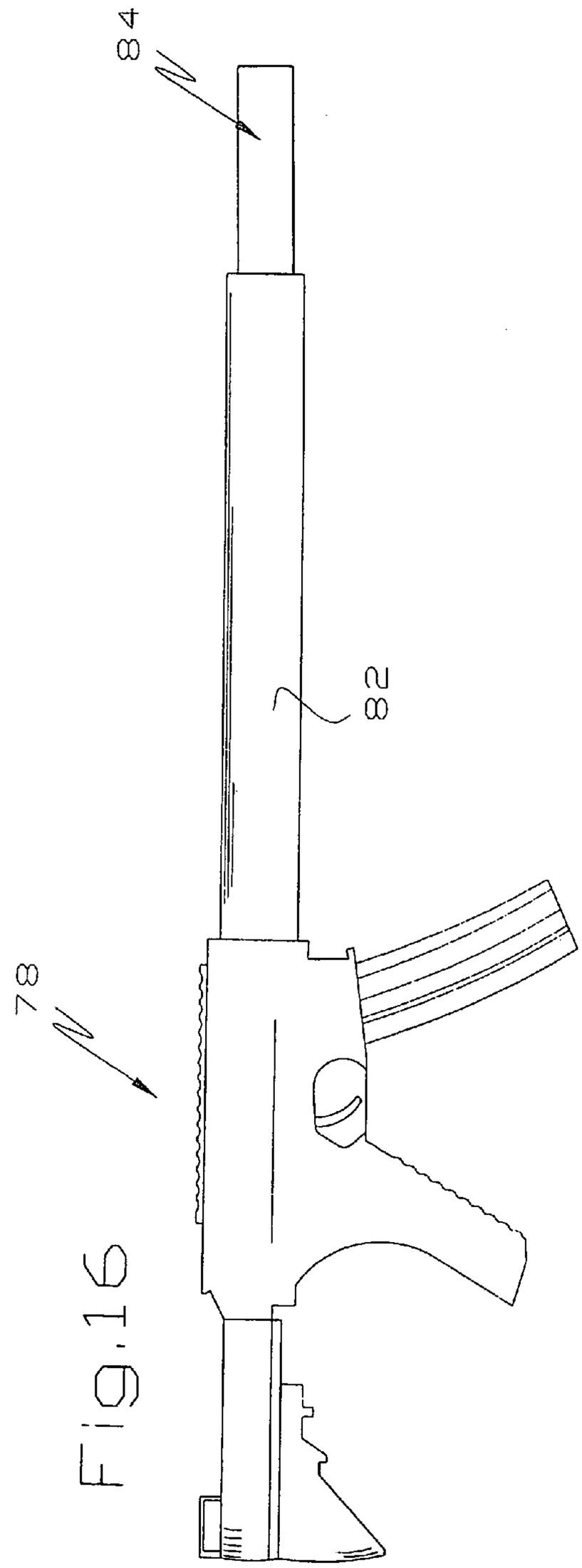

Fig.16

ASSEMBLY AND NOISE SUPPRESSOR FOR FIREARMS

[0001] This application is based on Provisional Patent Application Ser. No. 61/066,705, filed Feb. 21, 2008 on which priority is claimed and PCT/US2009/001062 filed Feb. 19, 2009.

[0002] This invention relates to an assembly and noise suppressor for rifles, automatic weapons, pistols, shotguns and similar firearms.

BACKGROUND OF THE INVENTION

[0003] Conventional silencers or noise suppressors are devices attached to the barrel of rifles, pistols and similar firearms for reducing the noise attendant upon firing of ammunition. Silencers are typically attached by machining threads on the discharge end of the barrel and then threading the silencer onto the barrel. This has a number of disadvantages, most particularly in high accuracy rifles, because the weight of the silencer deflects the barrel enough to affect the point of impact of rounds fired through the barrel. Given the strength of rifle barrels, this may sound implausible but is an awkward fact. Sniper rifles are equipped with scopes that have two settings, one for use with a silencer and one without. In the alternative, a second scope is used to counter the effect of barrel distortion caused by the weight of the silencer.

[0004] U.S. Pat. Nos. 832,695; 1,111,202; 1,140,578; 1,401,667; 4,341,283; 4,588,043; 4,920,854; 5,029,512; 5,164,535; 5,679,916; 5,753,846; 6,374,718; 6,575,074; 7,237,467 and 7,308,967 disclose various types of noise suppressor and/or silencer assemblies for firearms.

SUMMARY OF THE INVENTION

[0005] In this invention, an assembly is attached to the receiver of the rifle or to the barrel adjacent the junction of the barrel and receiver so the assembly is supported independently of the end of the barrel from which the projectile emerges. This is accomplished by securing a rigid load bearing support, which acts as a heat shield or stabilizer tube, to the receiver or to the barrel adjacent its junction with the receiver and attaching a noise suppressor to the support. Thus, the weight of the noise suppressor is not supported on the discharge end of the barrel so the accuracy of the firearm is not adversely affected by the weight of the suppressor. The support comprises an imperforate sleeve connected to the receiver or to the receiver end of the barrel. In most embodiments, the sleeve is threaded onto the receiver. The sleeve extends somewhat past the discharge end of the barrel. A noise suppressor is fixed to the distal end of the sleeve and provides a passage aligned with the barrel passage so fired projectiles pass seamlessly through the noise suppressor. The noise suppressor is preferably threaded onto the sleeve end.

[0006] This approach has many advantages. First, the weight of the noise suppressor is transmitted by the sleeve to the receiver independently of the barrel so the weight of the noise suppressor does not distort the barrel nor affect the point of impact of projectiles. Second, the annulus between the barrel exterior and the sleeve interior provides an expansion chamber for cooling propellant gases thereby enhancing the silencing ability of the device. Third, because the sleeve and noise suppressor are readily removable from the receiver, the device is easy to clean without sophisticated cleaning equipment. Fourth, projections on the inside of the sleeve abut the barrel near its discharge end damp barrel harmonic vibrations thereby promoting smaller impact groups.

[0007] In some embodiments, a novel noise suppressor is made in either two or three parts so it can be easily detached from the weapon, disassembled and cleaned without contending with many individual components. Although the noise suppressor is ideally suited for use with the sleeve surrounding the barrel as described above, it may be threaded or provided with an adapter to attach directly to the discharge end of a barrel in a conventional manner.

[0008] It is an object of this invention to provide an improved assembly for a firearm.

[0009] A further object of this invention is to provide an assembly including a noise suppressor which is supported from the receiver or barrel end adjacent the receiver, independently of the discharge end of the barrel.

[0010] These and other objects and advantages of this invention will become more apparent as this description proceeds, reference being made to the accompanying drawings and appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] FIG. **1** is a side view of a conventional rifle which has been modified to receive an assembly of this invention;

[0012] FIG. **2** is a side view of a sleeve or tubular beam that is attached to the rifle of FIG. **1**;

[0013] FIG. **3** is a side view of a noise suppressor attached to the end of the sleeve of FIG. **2**;

[0014] FIG. **4** is a partial isometric view of the receiver end of a barrel modified in accordance with this invention;

[0015] FIG. **5** is an isometric view of a barrel ring attachment of this invention;

[0016] FIG. **6** is a broken isometric view of the receiver end of a sleeve or tubular beam providing, at its opposite end, an attachment for a noise suppressor;

[0017] FIG. **7** is a broken isometric view of the barrel end of the sleeve or tubular beam of FIG. **2**;

[0018] FIG. **8** is an exploded isometric view of one embodiment of a noise suppressor;

[0019] FIG. **9** is an exploded cross-sectional view of the noise suppressing unit of the suppressor of FIG. **8**, the noise suppressing elements being shown in non-rotated positions and the tubular housing being omitted for purposes of illustration;

[0020] FIG. **10** is an exploded cross-sectional view of the barrel discharge end, end of the tubular beam of FIGS. **3** and **5** and a noise suppressor;

[0021] FIG. **11** is an isometric view of the entrance end of the noise suppressor of FIGS. **8** and **9**;

[0022] FIG. **12** is an exploded isometric view of another embodiment of a noise suppressor;

[0023] FIG. **13** is a view, similar to FIG. **9**, of the noise suppressor of FIG. **12** illustrating the noise suppressing elements in non-rotated positions and eliminating the tubular housing for purposes of illustration;

[0024] FIG. **14** is a side view of the rifle of FIG. **1** with a tubular beam secured to the receiver around the outside of the barrel and a noise suppressor on the end of the tubular beam;

[0025] FIG. **15** is a side view of another conventional firearm equipped with a conventional muzzle brake or flash suppressor; and

[0026] FIG. **16** illustrates the firearm of FIG. **15** equipped with an assembly of this invention.

DETAILED DESCRIPTION OF THE INVENTION

[0027] Referring to FIGS. **1-11**, a rifle **10** is illustrated as of a bolt action type having a stock **12**, a bolt **14**, a receiver **16** and a barrel **18**. Those skilled in the art will recognize the rifle **10** as being a conventional rifle known as a Fabrique National (FN) of the free floating barrel type where the barrel is attached to the receiver **16** but is slightly movable relative to the stock **12**. Those skilled in the art will recognize that free floating barrel type rifles comprise the majority of modern "counter sniper" weapons, as well as for all versions of the M16 and its civilian version, the AR15.

[0028] As shown by a comparison of FIGS. **1** and **14**, the rifle **10** has been modified by incorporating an assembly **20** which includes a rigid imperforate sleeve or tubular beam **22** and a noise suppressor **24**. The sleeve **22** is fixed to the receiver **16** or to the barrel **18** adjacent its junction with the receiver **16** in any suitable manner, as by welding, mating threads, adhesives or the like. Preferably, the sleeve **22** is threaded onto the rifle **10** as explained more fully hereinafter. It will be seen that the sleeve **22** is independent of the barrel **18** or is, at least, independent of the discharge end of the barrel **18**. In preferred embodiments, the sleeve **22** is threaded onto the rifle **10** as shown best in FIG. **4** where the receiver **16** or the receiver end of the barrel **18** is machined to provide threads **26** for receiving one end of the tubular beam **22**. In order to provide a clean appearance when the assembly **20** is removed from the rifle **10**, a barrel ring protector **28** shown in FIG. **5** may be threaded onto the receiver **16** to hide the threads **26**.

[0029] The tubular beam **22**, as shown best in FIGS. **6-7**, includes an imperforate elongate section **30** which, in the illustrated embodiment, is a composite material made of fibers and a resin, such as a carbon fiber composite having characteristic high strength, low weight, high heat tolerance, extreme heat dissipation, high corrosion resistance and high heat insulating qualities. The carbon fiber composite material is made in any suitable manner and the components are commercially available. In some embodiments, a barrel ring attachment **32** is fixed in a proximal end of the beam **22** in any suitable manner, as by threading, adhesives, welding or the like.

[0030] In the alternative, the elongate section **28** may be made of carbon steel, stainless steel, aluminum alloy, titanium alloy, ceramics, ceramic composites or any other suitable metal or alloy depending on the requirements of the particular task at hand. In these embodiments, the threaded end of the sleeve **22** can be provided simply by threading the end of the sleeve.

[0031] In some embodiments, the attachment **32** is metal such as stainless steel, carbon steel, titanium alloys, aluminum alloys or the like. The attachment **32** includes female threads **34** sized to pass onto the external threads **26** on the sleeve **20** thereby securing the sleeve **20** to the receiver **16** of the rifle **10** or to the barrel end adjacent the receiver **16**. It will be seen that the sleeve **20** connects to the firearm **10** independently of the discharge end of the barrel **18** so that supporting the noise suppressor **24** on the sleeve **20** does not distort the barrel **18**.

[0032] The distal or discharge end of the tubular beam **22** receives a barrel aligner **36** which is secured in the inside of the tubular section **30** in any suitable manner, as by welding, threading, adhesives or the like. In some embodiments, the barrel aligner **36** includes a metal body **38** such as stainless steel, carbon steel, titanium alloys, aluminum alloys, ceramics, ceramic composites or the like. The body **38** includes interior threads **40** for receiving threads of the noise suppressor **24** and a series of rigid inwardly directed projections or shoulders **42** which may be generally perpendicular to the barrel **18**. The inner ends of the projections **42** are spaced to slip over and abut a peripheral section **44** of the discharge end of the barrel **18**. It will be seen that the projections **42** prevent the sleeve **22** from being installed backwards on the barrel **18** because they will interfere with a larger part of the barrel **18** near the receiver **16** so the threads **34** cannot engage the threads **26**.

[0033] As shown best in FIG. **10**, the noise suppressor **24** and sleeve **20** are arranged to allow propellant gases to flow into an annulus **46** between the interior of the sleeve **20** and the exterior of the barrel **18**. This may be accomplished in a variety of ways, as by threading the noise suppressor **24** into the barrel aligner **36** so the threads bottom out before the noise suppressor **24** abuts the end **48** of the barrel **18**. The distance the noise suppressor **24** is spaced from the barrel end **48** is subject to considerable variation but need not be overly extensive because the volume of the annulus **46** is normally very large compared to the volume between the barrel end **48** and the noise suppressor **24**. This allows the noise suppressor **24** to be shorter than conventional suppressors which are typically spaced several inches from the barrel end. In most embodiments, this distance may be on the order of an inch or so.

[0034] In prototypes of the sleeve **20**, the elongate section **30** is a carbon fiber tube while the barrel ring attachment **32** and barrel aligner **36** are carbon steel which has been treated to be black. In the prototype, the inside of the barrel aligner **36** has to be closely inspected to see that the projections **42** do not come directly out of the carbon fiber tube **30**.

[0035] The noise suppressor **24** shown in FIG. **8** is of an unusual or unconventional design comprising only three separate pieces, i.e. a tube or housing **50**, a noise suppressing unit **52** closely received inside the housing **50** and a closure or end cap **54**. Although the noise suppressor **24** may be made of any suitable material compatible with the rifle **10**, in some embodiments, the housing **50** can be made of carbon fiber composite having a metal fitting **56** fixed on the entrance end of the noise suppressor **24** providing an opening **57** for passing a projectile, threads **58** for attachment to the barrel aligner **36** and threads **59** for attachment to the tubular housing **50**. The entrance end of the housing **50** includes a structure or groove **61** which is concave toward the muzzle end of the barrel **18** for more efficiently deflecting or directing propellant gases toward the annulus **46** provided by the sleeve **22** and barrel **18**. It will be seen that the groove **61** is concave in a direction away from the exit end of the housing **50**.

[0036] The noise suppressing unit **52** comprises a series of more-or-less identical noise suppressing segments **60** which are fused together, either by welding after machining, by machining a single billet or by casting the segments **60** as a single unit. The noise suppressing segments **60** are shown best in FIG. **9** and include a frustoconical baffle **62** providing an axial opening **64** therein of a size to pass a projectile from the barrel **18**. The frustoconical baffle **62** has a small diameter end facing the barrel end **48** and a pair of laterally or radially facing openings **66** communicating between an interior volume **68** and grooves **70** extending around the segment **60** as shown best in FIG. **8**.

[0037] It will be seen that propellant gases passing into the suppressor **24** are deflected by the frustoconical baffles **62**. At the entrance end of the suppressor **24**, some of the propellant gases are deflected into the annulus **46** between the sleeve **22** and the barrel **18**. Because the annulus **46** is relatively large, the silencing efficiency of the assembly **20** is much increased compared to a conventional noise suppressor. It will be apparent that this invention incorporates a very large gas expansion chamber for a noise suppressor while adding only a very small increment of length to the rifle **10** as best seen in a comparison of FIG. **1** with FIG. **14**.

[0038] Each succeeding baffle **62** deflects some of the propellant gas through the lateral openings **66** of the upstream segment **60**. In some embodiments, as shown in FIG. **8**, the segments **66** are progressively offset relative to the upstream segment in order to slightly direct the gas in a rotating manner around the axis of the suppressor unit **52**. The more gas movement created inside the suppressor **24**, the more the gas is cooled. In addition, some of the gas gets trapped in the grooves **70** to the same effect. Although the amount of angular offset may vary widely, a preferred amount of offset is in the range of 30-45° for more efficiently rotating propellant gas around the suppressor unit **52**.

[0039] The end cap **54** is conveniently made of metal having an opening **71** aligned with the openings **57**, **64** and threads **72** for attachment to threads **74** machined in the exit end of the tube **50**. It will be seen that the suppressor **24** comprises only three pieces so it may be disassembled simply by unscrewing it from the rifle **10**, unscrewing the end cap **54** and allowing the noise suppressing unit **52** to fall out of the tube **50**. These components can be rinsed off and reassembled as quickly. Because the interior of noise suppressors inherently accumulate propellant debris, the ability to quickly disassemble, clean and reassemble the suppressor **24** is a major advantage. In a combat situation where sand, grit, mud and the like will accumulate in the suppressor **24**, this advantage is particularly important.

[0040] Assembly of the assembly **20** of this invention should now be apparent. Conveniently, the sleeve **22** is first threaded onto the barrel **18** so the projections **42** slip over the peripheral end **44** of the barrel **18**. At this stage of assembly, the tubular beam **20** becomes a heat shield and can stay on a rifle as such without installation of the noise suppressor **24** and thus without altering the noise of the rifle.

[0041] When the suppressor **24** is threaded into the barrel aligner **36**, the bores **57**, **64**, **71** of the noise suppressor **24** align with the barrel bore **76**. It will be seen that the weight of the noise suppressor **24** is borne by the tubular beam **22** independently of the discharge end of the barrel **18**. In conventional noise suppressors, there is one point of alignment between the barrel bore and the suppressor, which are the threads between them. In the assembly **20**, there are three points of alignment, i.e. the connection between the sleeve **22** and the barrel **18**, the projections **42** abutting the muzzle end of the barrel **18** and the connection between the barrel aligner **36** and the noise suppressor **24**. This inherently is a more reliable technique of sending projectiles down the center of the noise suppressor **24**.

[0042] It is said that the only perfect noise suppressor is one that captures all of the gases generated by powder burning in the fired cartridge. In this invention, the propellant gases are partially trapped in chambers between the baffles **62** and a sizeable portion of the gases are redirected rearwardly into the annulus **46** or into the annulus between the side walls **70** and the housing **50**. These redirected propellant gases cool off and thereby drastically reduce in volume thereby reducing the sound producing ability of the gases. Shortly after the projectile clears the suppressor **24**, the redirected propellant gases leak off through the suppressor **24** in a conventional manner so the pressure generated in the annulus ultimately dissipates. By supporting the noise suppressor **24** from the receiver **16** or from the back of the barrel **18** at a location near its junction with the receiver **16**, the weight of the noise suppressor **24** cannot distort the barrel **18** and therefore cannot affect the point of impact of projectiles fired from the rifle **10**.

[0043] It will be seen that it is easy to clean the sleeve **22**. After removing the noise suppressor **24**, the sleeve **22** can be unthreaded from the receiver **16**. The inside of the sleeve **22** can accordingly be cleaned in any suitable manner.

[0044] Referring to FIGS. **15-16**, a conventional rifle **78** which will be recognized by those skilled in the art as an M16 is modified by installing an installation sleeve **80** having threads to receive a sleeve **82**. A noise suppressor **84** is threaded onto the end of the sleeve **82**. It will be seen that the sleeve **82** slips over the existing flash suppressor/muzzle brake rather than having to remove it as with conventional noise suppressors. In addition, an existing flash suppressor or muzzle brake directs gas laterally before it reaches the suppressor **84** thereby making the suppressor **84** more effective. FIG. **16** shows that the suppressor **84** need not be the same diameter as the sleeve **82**. It will be apparent that a sleeve and noise suppressor of this invention may be attached to firearms of almost any description.

[0045] A test firing was conducted on Sep. 22, 2008 at a location near Corpus Christi, Texas at an outdoor shooting range. The temperature was 85° F. on a sunny day with low humidity and no wind. A Savage Arms Model 10FP, caliber 7.62 NATO (.308 Winchester) was fired by an experienced marksman and the trial was coordinated by a Production Manager experienced in quality control. The rifle was equipped with a Harris bipod placed on a steel table with the shooter being seated. The target was downrange 200 yards from the shooter. The target was pressed wood backed paper with cross centers at 200 yards. The ammunition was Federal Premium, Gold Medal Match, 168 grain Sierra Matchking, BTHP. The scope was a Leopold MKIV, Police Tactical. Ten groups of five rounds each were fired without the assembly **20** of this invention and ten groups of five rounds each were fired with the assembly **20** of this invention. The rifle was not rezeroed nor was the scope setting adjusted after firing rounds without the assembly **20**. The average group size without the assembly **20** was 1.25 inches in diameter. The average group size with the assembly **20** was 1.15 inches in diameter. The sound level unsuppressed was 162 decibels. The sound level suppressed was 96 decibels for a 66 decibel reduction. One thing is very clear: the assembly **20** did not deleteriously affect the accuracy of the rifle. The improvement in group size is necessarily small and it is difficult to conclude, given the small sample size, that this will always hold true. But, it suggests that the projections **42** are effective to dampen harmonic vibrations of the rifle barrel and thereby improve accuracy when compared to the same unsuppressed rifle.

[0046] Referring to FIG. **12**, another embodiment of a noise suppressor **86** is illustrated. The noise suppressor **86** has exactly two separate pieces, i.e. a housing **88** and a combined noise suppressing and closure unit **90**. The housing **88** may be substantially identical to the housing **50** except the fitting **92** includes one set of external threads **94** for attachment to the

barrel aligner **36** and a second set of internal threads **96** for receiving the threads **98** of the unit **90**. The unit **90** also includes a series of noise suppressing segments **100** fused together and an end cap **102** abutting the end of the housing **88**. The noise suppressor **86** has several advantages over the suppressor **24**. First, the inside of the housing **88** need not be machined to provide threads to receive the end cap. Second, there are only two separate pieces so cleaning of the suppressor **86** is even easier and losing one of the parts is even less remote. Third, the suppressing unit **90** cannot be installed backwards.

[0047] After seeing the noise suppressor **86**, it will be apparent that the noise suppressor **24** may be modified by fusing the end cap **54** to the suppressing unit **52** and thereby reducing the number of separate pieces to exactly two. This also has the advantage of preventing misassembly of the noise suppressor **24**.

[0048] Although the noise suppressors **24**, **86** are of unusual design, a more conventional noise suppressor can readily be adapted for use in this invention by attachment to the barrel aligner **36** with a suitable adapter coupling. It will also be apparent that the suppressors **24**, **86** can be manufactured to thread directly onto the end of a conventionally threaded barrel or a suitable adapter may be provided to thread onto a barrel and receive the threads **56**, **92**.

[0049] Although threads are illustrated as connecting the sleeve and rifle and connecting the noise suppressor and sleeve, it will be understood that other suitable connectors may likewise be used, such as interlocking lugs or the like.

[0050] Although this invention has been disclosed and described in its preferred forms with a certain degree of particularity, it is understood that the present disclosure of the preferred forms is only by, way of example and that numerous changes in the details of operation and in the combination and arrangement of parts may be resorted to without departing from the spirit and scope of the invention as hereinafter claimed.

I claim:

1. A firearm comprising a receiver having a barrel terminating in a muzzle, the barrel being imperforate on its periphery from the receiver to the muzzle and an assembly comprising

an imperforate rigid sleeve connected to the firearm at a location adjacent a junction of the barrel and receiver and distant from the muzzle, the sleeve surrounding the barrel and extending from the junction to adjacent the muzzle; and

a noise suppressor rigid with the sleeve having a series of noise suppressing elements, an upstream element being spaced from the muzzle,

there being an annular space between the rigid sleeve and the barrel open to receive propellant gases exiting out of the muzzle.

2. The firearm of claim **1** wherein the sleeve is a one piece unit and the noise suppressor comprises exactly three separate pieces including an external tubular housing, a removable end cap connected to the tubular housing and having a protrusion extending outwardly beyond an end of the tubular housing and a unitary noise suppressing section including a series of separately made noise suppressing elements fused together to provide a series of gas expansion chambers, the end cap being arranged to couple and uncouple from the housing upon manipulation of the protrusion whereby the end cap may be removed by grasping the same and uncoupling the end cap from the tubular housing to thereby readily disassemble the noise suppressor for cleaning.

3. The firearm of claim **1** wherein the sleeve is a one piece unit and the noise suppressor comprises exactly two pieces including the tubular housing and one piece comprising an end cap and a unitary noise suppressing section comprising a plurality of separately made noise suppressing elements fused together to provide a series of gas expansion chambers, the end cap having a protrusion extending outwardly beyond an end of the tubular housing, the end cap being arranged to couple and uncouple from the housing upon manipulation of the protrusion whereby the end cap may be grasped to uncouple the end cap from the tubular housing to thereby readily disassemble the noise suppressor for cleaning.

4. The firearm of claim **3** wherein the tubular housing comprises a first connector adjacent an inlet end of the noise suppressor for connection to the sleeve and a second connector adjacent an inlet end of the noise suppressor for connection to the end cap/noise suppressing section.

5. The firearm of claim **3** wherein the first and second connectors are threads.

6. The firearm of claim **1** wherein the sleeve comprises an elongate section made of a material selected from the group consisting of carbon fiber, stainless steel, carbon steel, titanium alloys, ceramics, ceramic composites and aluminum alloys.

7. The firearm of claim **1** wherein the noise suppressor comprises a tubular housing having an imperforate side wall and providing an entrance end and an exit end and a connector adjacent the entrance end for attachment to a firearm; a multiplicity of separately made noise suppressing elements, inside the housing, each of the noise suppressing elements comprising a baffle having a central opening for passing a projectile from the firearm, the elements being fused together into a unit; and a closure seating against the exit end of the housing and having a protrusion extending outwardly beyond an end of the tubular housing, the end cap being arranged to couple and uncouple from the housing upon manipulation of the protrusion whereby the end cap may be grasped to uncouple the end cap from the tubular housing to thereby disassemble the noise suppressor for cleaning.

8. The firearm of claim **7** wherein the connector comprises a first set of threads, wherein the housing comprises a second set of threads adjacent the housing exit end, and wherein the closure being a separate component from the noise suppressor element unit, the closure abutting the exit end of the housing and having a third set of threads mating with the second set of threads.

9. The firearm of claim **7** wherein the connector comprises a first set of threads, wherein the housing comprises a second set of threads on an interior of the housing adjacent the entrance end and the noise suppressor element unit comprises a third set of threads mating with the second set of threads on the entrance end of the housing, the closure being of one piece with the baffle unit and abutting the exit end of the housing.

10. The firearm of claim **7** wherein the closure is fused to the noise suppressor unit.

11. The firearm of claim **1** wherein the sleeve extends beyond the muzzle.

12. The firearm of claim **1** wherein the sleeve provides an internal abutment rigid with the sleeve abutting a peripheral section of the barrel adjacent the muzzle.

13. The firearm of claim **1** wherein the noise suppressor being wholly supported by the sleeve.

14. A noise suppressor for a firearm comprising

a tubular housing having an imperforate side wall and providing an entrance end and an exit end and a connector adjacent the entrance end for attachment to a firearm;

a multiplicity of noise suppressing elements, inside the housing, each of the noise suppressing elements comprising a baffle having a central opening for passing a projectile from the firearm, the elements being separately made and then fused together into a unit; and

a closure seating against the housing and having a protrusion extending outwardly from an end of the tubular housing sufficiently far for a user to grasp, the closure being arranged to couple and uncouple from the housing upon manipulation of the protrusion;

the noise suppressor comprising no more than three parts whereby it may be readily disassembled, for cleaning, by manipulating the protrusion.

15. The noise suppressor of claim **14** wherein the connector comprises threads.

16. The noise suppressor of claim **14** wherein the connector is adjacent the housing entrance end, wherein the housing comprises a second connector adjacent the housing exit end, and wherein the closure being a separate component from the noise suppressor element unit, the closure abutting the exit end of the housing and having a third connector mating with the second connector.

17. The noise suppressor of claim **14** wherein the connector is adjacent the housing entrance end, wherein the housing comprises a second connector on an interior of the housing adjacent the entrance end and the noise suppressor element unit comprises a third connector mating with the second connector on the entrance end of the housing, the closure being of one piece with the baffle unit and abutting the exit end of the housing.

18. The noise suppressor of claim **14** wherein the noise suppressing elements are welded together.

19. The noise suppressor of claim **14** wherein the closure is fused to the suppressing unit and the noise suppressor comprises exactly two separate pieces.

20. The noise suppressor of claim **14** wherein the noise suppressor comprises exactly three separate pieces.

21. The noise suppressor of claim **14** comprising a structure located at the entrance end of the housing that is concave away from the exit end of the housing for deflecting some propellant gases out of the entrance end of the housing.

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