



CONSTITUTION ARMS™
12 Hoffman Street • Maplewood, NJ 07040-1114
(973) 378-8011 • www.constitutionarms.com



Specification



An ergonomically novel self-defense firearm intended for seniors, disabled and others with limited manual dexterity or hand strength. ATF classified as standard pistol, not “Any Other Weapon” (AOW) under the National Firearms Act (NFA).

Palm Pistol®

Patents US7905042, D628259

Specification

Introduction

The Palm Pistol® is an ergonomically novel self-defensive firearm that uses the thumb for striker/firing pin release instead of the index finger. It is both ambidextrous and bilaterally symmetrical about its longitudinal axis rendering it functionally independent of the users hand dominance or bilateral orientation. It has no iron sights thus rendering eye dominance and sight alignment immaterial. The Palm Pistol® has 10 safety features, including three independent safeties that must be activated by the shooter using three different fingers before the pistol can be fired. Therefore, the action of the Palm Pistol® is not comparable to other single action handguns.

Design Considerations

One of the two principal factors of inaccurate fire is lateral muzzle drift induced during trigger squeeze.¹ Use of the thumb for releasing the firing pin mitigates this problem. Also, the slim profile presents the ability to readily conceal the firearm without imprinting. There are no external moving parts which permit it to be fired from within a pocket or other clothing without the possibility of jamming on fabric.

The design incorporates a latch safety, striker block, disengaged sear stop, cocked striker indicator, loaded chamber indicator, hand guard and grip assist ramp. A Picatinny rail for attaching accessories such as a strike bezel, extra round carrier, light or the LaserLyte Subcompact V4 laser sight may also be incorporated as optional features.

Two independently operable grip safeties are located dorsally and ventrally about the barrel on the forward face of the vertically oriented grip/receiver. These must be fully depressed in order to release the otherwise immobilized triggers. The triggers, in turn, are protected by spring-loaded covers which operate as manual safeties since the pistol cannot be fired unless one of the covers is lifted into the "up" position." Also, the forward edge of the grip/receiver and depressed grip safeties provides a straight line reference plane perpendicular to the centerline of the bore, enabling proprioceptive determination of barrel elevation, further mitigating the need for iron sights.

An additional advantage of the design is its low bore axis. Recoil forces are directed rearward, coincident with the centerline of the forearm. This may reduce muzzle rise that occurs where the bore axis in traditionally configured handguns is above the centerline of the forearm. The design has dynamics similar to a rifle where the recoil force is directed rearward to the shoulder but in this instance, the palm is simply substituted for the shoulder. Furthermore, use of the thumb for striker/firing pin release may reduce the likelihood of an accidental discharge due to startling and body alarm reaction (BAR) induced during a high stress encounter with an armed opponent.

Applications

The design is suited for home use, concealed carry enthusiasts, collectors and as a backup gun. It is ideal for seniors, disabled or others who may have dexterity limitations or difficulty sighting and controlling a traditional revolver or semi-automatic pistol. For example, it may serve as an adaptive aid defensive firearm for people with phalangeal amputations or fusions. Approximately 30,000 non-work related amputations involving one or more fingers occur annually within the United States.²

¹ *The Basics of Pistol Shooting*, Page 60, First Ed., January 1991, National Rifle Association, Fairfax, VA.

² *Annals of Emergency Medicine*, Volume 45, Issue 6, June 2005, pages 630-635.

A 2007 study by the US DOJ Bureau of Justice Statistics indicated that violent crime against persons with disabilities was 1.5 times higher than those without disabilities and the rate of rape or sexual assault was more than two times higher. Disabled females had higher rates of victimization than disabled males.³

Arthritis is the most common cause of disability in the United States. The Center for Disease Control reports that 46 million Americans (22%) suffer from arthritis, limiting the activity of 19 million adults (9% of all adults). This will increase to 67 million adults (25%) and limiting the activity of 25 million (37%) by the year 2030.⁴

A 1998 study suggested that 7-10% of the adult population is left handed and this occurs more frequently in males.⁵ The vast majority of firearms are designed for right-handed shooters, with the grip, magazine release, and/or safety mechanisms set up for manipulation by the right hand, and fired cartridge cases ejected to the right. A left-handed shooter must either purchase a left-handed firearm (which are manufactured in smaller numbers and are generally more expensive and/or harder to obtain), shoot a right-handed gun left-handed (which presents certain difficulties, such as the controls being improperly located for them or hot cartridge casings being ejected towards their body, especially their eyes), or learn to shoot right-handed (which may pose additional problems, primarily that of ocular dominance). Some guns feature ambidextrous or right/left-handed reversible operating parts but most do not.⁶ These problems are all mitigated by the Palm Pistol[®] since it is ambidextrous.

The design may also have government application for employees who require personal protection yet do not traditionally train with or carry firearms. This might include civilian administrative staff working on government installations in high risk domestic or foreign locations (embassy personnel who are at risk of kidnapping), employees who might be intimidated by revolvers or semi-automatic pistols, or clandestine personnel. It may also serve as a backup gun for military, police, commanders located in the confined quarters of a tank, airline pilots or stewards or security guards. According to FBI Uniform Crime Report statistics, 12% of officer victims killed in the line of duty are shot with their own handgun.⁷ This has elevated firearm retention as a major training issue. The Palm Pistol[®] is well suited for officer weak side use for repelling disarming attempts. Furthermore, certain clandestine operations require the user of a firearm to “divorce” themselves from its use. Carried in the pocket with no holster, this separation is facilitated.

Medical indications for use include but are not limited to arthritis; peripheral neuropathy caused by chemotherapy, infection, traumatic injury or diabetes; phalangeal amputations/fusions/fractures; distal muscular dystrophy; ankylosing spondylitis; multiple sclerosis; Parkinson’s disease; dyskinesia; cerebral palsy; carpal tunnel syndrome, Raynaud’s syndrome; ganglion cysts; side effects of certain medications; and inclusion body myositis. Gripping the device requires an intact thumb and two adjacent fingers with proximal and intermediate phalanges. It can also be fired without a thumb by using the index finger of either hand for depressing the trigger and an upward cocking of the wrist.

Computer Simulations

During the period October 2009 through January 2010, extensive computer simulated displacement stress and fatigue assessments of the design were performed by finite element analysis (FEA). The purpose was to ensure that the inevitable hardware testing be done on a mature embodiment not exhibiting early fatigue due to egregious strength flaws that would entail iterative and costly remedial activity.

³ Rand, M. R.; and Harrell, E. (October 2009) US DOJ Bureau of Justice Statistics National Crime Victimization Survey “Crime Against People with Disabilities, 2007,” See <http://bjs.ojp.usdoj.gov/content/pub/pdf/capd07.pdf>.

⁴ CDC Center for Chronic Disease Prevention and Health Promotion. See http://www.cdc.gov/arthritis/data_statistics/index.htm.

⁵ Raymond, M.; Pontier, D.; Dufour, A.; and Pape, M. (1996). *Frequency-Dependent Maintenance of Left-Handedness in Humans*, Proceedings of the Royal Society of London, B, 263, 1627-1633.

⁶ See <http://en.wikipedia.org/wiki/Left-handed>.

⁷ FBI Uniform Crime Reports. See <http://www.fbi.gov/ucr/killed/2007/index.html>.

Five critical Palm Pistol® components were evaluated including the barrel, receiver, latch, barrel pivot pin and latch pivot pin. FEA was conducted over four phases. These were:

- Phase 1* – the baseline examining stress conditions of an initial pistol design assembly;
- Phase 2* – examination of stresses in the latch and barrel tab features of two improved stress mitigating embodiments compared to the baseline design;
- Phase 3* – examination of a new pistol assembly for stress mitigation based on the most advantageous design elements learned from Phases 1 and 2; and
- Phase 4* – comparative stress analysis on a commercially available Derringer design of the same caliber as the Palm Pistol® to assess accepted standards of safety in the handgun market.

The baseline design exhibited likely early mechanical failure recognized as low cycle fatigue using a process of comparison to known fatigue modes understood from generally accepted engineering practice. However, the final design was found to be demonstrably more robust than the original thus moving the mechanical firing life cycle into the high cycle life region. This was confirmed by comparison of the final design to a commercially viable Derringer design competitor which employs a similar barrel hinge pin and battery lock pin. The Derringer failed the high cycle life criterion whereas the Palm Pistol® handily passed. The FEA analysis concluded that due diligence using state-of-the-art analytical tools had been applied and findings would need to be confirmed through real-world hardware endurance testing.

First Prototype Endurance Testing

The first fully functional prototype was completed in early July 2010. Construction was based on the mature embodiment design evaluated under Phase 3 of the FEA. Endurance testing was performed during August 2010 in accordance with methods specified in H.P. White Laboratory, Inc. Method HPW-TP-0100.00 “Small Arms Safety Examination and Test Procedures” June 1988. This consisted of firing 10,000 standard load .38 special cartridges and one proof load per 100 standard loads (100 total proof loads). After every 500th standard load and five proof loads, the prototype was completely disassembled and the five critical components were subjected to wet fluorescent magnetic particle inspection (MPI) by a Performance Review Institute (PRI) National Aerospace and Defense Contractors Accreditation Program (NADCAP) accredited laboratory in accordance with ASTM International Method ASTM-E-1444-05 “Standard Practice for Magnetic Particle Testing.” Final conclusions were “no indications found.”

Drop Testing

Drop testing was completed in February, 2011 in accordance with Method HPW-TP-0100.00 referenced above. The performance criteria involved dropping the working prototype, loaded with a primed casing under two configurations, onto each of its six cardinal directions (muzzle, rear of stock, latch side, barrel hinge side and two trigger sides) from a five foot height onto steel plate without the gun firing. The two configurations were “normally cocked” and “latch safety engaged” condition. All 12 drops were successful.

Patents

US Design Patent US D628,259 S was issued on November 30, 2010 and US Utility Patent US 7,905,042 B2 was issued March 15, 2011. The utility patent was issued on a “first action allowance” accepting all 23 claims without prosecution. In addition, domestic and international patent searches revealed no prior art. These facts support the claim that the Palm Pistol® is an innovative and unique firearm.

Production First Article Function Testing

A set of three production first article fully working prototypes were built which incorporated lessons learned and improvements suggested during initial endurance and drop testing. This includes tightened select tolerances; improved manufacturing efficiencies; and final material selection, metal finishing and production colors. First article samples of each custom fabricated part was submitted to a third party engineering consultant to confirm conformance to design specifications including dimensions, tolerances, hardness and surface finish. See Appendix for list of dimensional tolerances on custom machined parts. Material certifications which document domestically or DFARS compliant sourcing were also collected.

Production Quality Control Protocol

The Palm Pistol® is comprised of 71 parts, not including the optional accessories. The five structurally critical components (barrel, latch, receiver, barrel pivot pin, latch pivot pin) for every gun produced are proof tested in a Savage Range Systems bullet trap using SAAMI specification .38 special proof loads. After firing, the barrel, latch and receiver are subjected to wet fluorescent magnetic particle inspection (MPI) by a Performance Review Institute (PRI) National Aerospace and Defense Contractors Accreditation Program (NADCAP) accredited laboratory in accordance with ASTM International Method ASTM-E-1444-05 "Standard Practice for Magnetic Particle Testing." Acceptance criteria is "no indications found." The two stock pins are subject to visual inspection only. If the three MPI tested components pass, each is proofmarked and returned for nickel plating and use in final assembly.

Marketing

The Federal Interagency Forum on Aging estimates the number of adults aged 65 and older will reach 71.5 million by the year 2030, twice the number in 2000 and representing approximately 20% of the total US population⁸ and a significant potential market for the Palm Pistol®.

The majority of states now permit concealed carry of firearms for personal defense and this will present a steady civilian market for this type of highly concealable gun. The Supreme Court decisions in *District of Columbia v. Heller* and *Chicago v. McDonald* which affirmed the individual right to keep and bear arms, and that this right extends to all the states, may produce an increased demand for concealed carry firearms. The success of the Taser C2 and increased manufacturers marketing campaigns in mainstream publications such as *PC Magazine* further suggests widespread potential interest in this product type. Also, the increasing interest in cane fighting by senior citizens for both exercise and self-defense, suggests a large potential market.

The National Shooting Sports Foundation (www.nssf.org) is the trade association for the shooting, hunting and firearms industry. Monthly National Instant Criminal Background Check System (NICS) figures are tracked by the organization as a surrogate for national firearms sales estimates. The chart shown in the Appendix published in their December 8, 2008 *Bullet Points Online News Service* indicated that background checks on the sale of firearms reached record levels during the month of November, pointing to a spike in sales for the month. A total of 1,529,635 checks, the highest monthly total ever, were reported for the month, up from 1,079,923 in November 2007.

The US DOJ Bureau of Justice Statistics reported 8,612,000 NICS checks (all firearms) for 2006 with a 1.6% denial rate, resulting in 8,477,000 approvals.⁹ During the same year, the Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF) reported 1,403,329 handguns were manufactured.¹⁰ Thus, new handgun sales can be estimated to represent 17% of all guns transferred during a given year.

If only considering those 9% of adults suffering with activity-limiting arthritis, and disregarding multiple sales, the estimated number of prospects for the Palm Pistol® based on ATF 2006 manufacturing figures, is 9% of handguns manufactured and retained domestically or 110,739.

Sales

Sales will be through federally licensed firearms dealers; direct to consumers by Constitution Arms, an 07 Federal Firearms Licensee (FFL) and NJ Wholesaler/Manufacturer, through the company's own website at www.palmpistol.com; various online auction websites; and wholesale distributors. An attempt will be made to produce the product entirely with US made components. The ATF has classified the design as a standard

⁸ See http://www.agingstats.gov/agingstatsdotnet/Main_Site/Data/2008_Documents/tables/Tables.aspx.

⁹ *Background Checks for Firearms Transfers, 2007*, US DOJ Bureau of Justice Statistics, <http://www.ojp.usdoj.gov/bjs/pub/html/bcft/2007/table/bcft07st01.htm>.

¹⁰ *2006 Annual Firearms Manufacturing and Export Report*. See <http://www.atf.treas.gov/firearms/stats/afmer/afmer2006.pdf>.

“pistol” and is thus not subject to National Firearms Act (NFA) regulations. This will permit the gun to be sold like any other traditional handgun without the additional tax and registration requirements of designs that otherwise would have been classified as “Any Other Weapon” (AOW).

For further Information, contact Matthew Carmel, President, Constitution Arms™, (973) 378-8011 mcarmel@constitutionarms.com.

Appendix

Palm Pistol® Advantage/Disadvantage Matrix		
Parameter	Advantage	Disadvantage
<i>Design and Function</i>		
Single shot	Clearly defines firearm as self-defensive and less likely to be banned outright by anti-gun states. Attacker unable to use against victim after first shot.	Victim only has one opportunity to stop attacker before reloading.
Use of thumb to fire	Reduces muzzle drift. Less likelihood of accidental discharge from body alarm reaction. Thumb is stronger than index finger. Adaptive aid for handicapped such as users with phalangeal amputations or fusions, arthritis or others with limited manual dexterity.	Unconventional mode of operation requires familiarization.
Laser sight	Eliminates need for sight alignment. Attacker may cease pressing his assault when observing his body targeted by laser.	Not visible in bright daylight. Requires battery maintenance. Increases weight of firearm and makes it less concealable.
Chambering	.38 special has reasonable stopping power if using a hollow point or EFMJ round. Lower recoil, report, muzzle flash, weight and cost of larger calibers.	May have less stopping power, all else being theoretically equal, than larger caliber conventional rounds.
Ambidexterity and bilateral symmetry	May be fired effectively without regard to hand or eye dominance.	None.
No external moving parts	Can be fired from concealment without hanging up on clothing.	No visual clue that firearm is operable.
Breech loading	Easy access to chamber.	None.
Unconventional profile	Imprint through clothing does not have appearance of a firearm.	None.
<i>Mechanical Safeties</i>		
Latch safety	Arrests striker during firing if barrel is not fully closed with latch mated to receiver.	Any mechanical safety may be subject to physical failure.
Two spring loaded trigger covers	Prevents unintentional depression of trigger buttons when grip safeties are depressed.	Any mechanical safety may be subject to physical failure.
Two independently operable grip safeties	Prevents unintentional discharges from depressing trigger buttons.	Any mechanical safety may be subject to physical failure.
Disengaged sear block	Prevents depression of trigger(s) during recocking and assures sear engages with striker lugs.	Any mechanical safety may be subject to physical failure.
Striker safety block	Blocks striker in the event of sear failure.	Any mechanical safety may be subject to physical failure.
Cocked striker indicator	Alerts user to cocked striker condition by both sight and feel.	Any mechanical safety may be subject to physical failure.
Loaded chamber indicator	Alerts user to loaded chamber condition by both sight and feel.	Any mechanical safety may be subject to physical failure.
Hand guard	Prevents gripping hand from covering muzzle	Any mechanical safety may be subject to physical failure.
Grip assist ramp	Positions stock in easy-to-grasp position when lying on a flat surface.	None.

Dimensional Tolerances +/- (inches)					
Part	.004	.003	.002	.001	.0005
Barrel		1	3		2
Charging Arm		1	2	1	
Charging Arm Spring Plug			1	1	
Disconnect				1	
Ejector Rod		1	2		
Frame			3	3	
Hand Guard		6	8	1	
Latch		1			
Latch Safety			1	1	
Picatinny Rail			4		
Receiver		3	4	4	2
Safety Bar		2	1		
Sear			3		
Striker		1	5		
Striker Safety Shaft			2	1	
Striker Spring Plug				1	
Trigger Bar, Long		1	5		
Trigger Bar, Short	1	1	6		
Total	1	18	50	14	4

Note: All other tolerances +/- .005

Numbers and Rates of Violent Victimization Among Persons With and Without Disabilities, by Type of Crime, 2007 ¹							
Type of Crime	Persons with Disabilities				Persons without Disabilities		
	Number	Percent	Rate per 1,000		Number	Percent	Rate per 1,000
			Age Adjusted	Unadjusted			
Total Violent Crime	716,320	100.0	32.4	18.1	4,432,460	100.0	21.3
<i>Serious Violent Crime</i>	240,070	33.5	11.1	6.1	1,460,450	32.9	7.0
Rape/Sexual Assault	47,440	6.6	2.4	1.2	185,600	4.2	0.9
Robbery	78,990	11.0	3.2	2.0	516,000	11.6	2.5
Aggravated Assault	113,640	15.9	5.5	2.9	758,900	17.1	3.6
<i>Simple Assault</i>	476,250	66.5	21.3	12.0	2,972,020	67.1	14.3

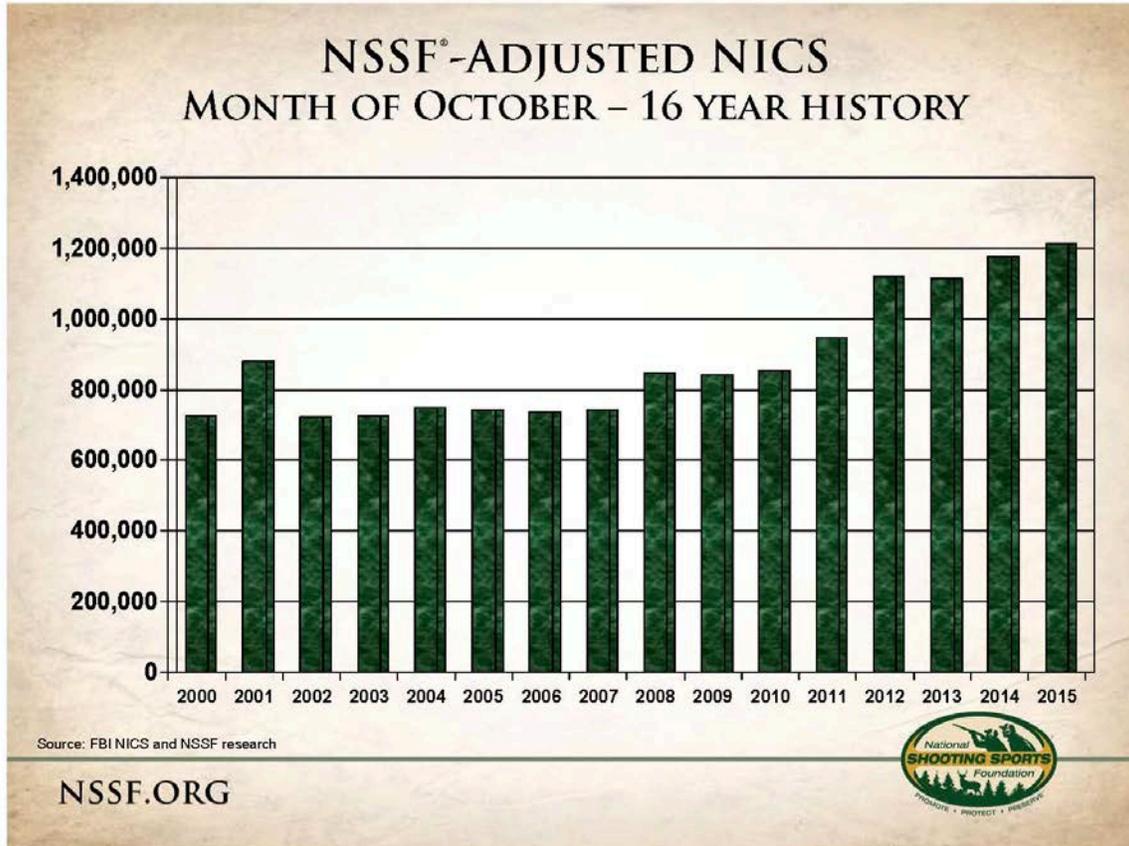
¹ From US DOJ Bureau of Justices Statistics. See <http://bjs.ojp.usdoj.gov/content/pub/pdf/capd07.pdf>.

Law Enforcement Officers Feloniously Killed with Own Weapons, by Type of Victim Officer's Weapon, 1998–2007¹

<i>Weapon</i>	<i>Caliber</i>	<i>Total</i>	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
No. of victim officers, all weapons		549	61	42	51	70	56	52	57	55	48	57
No. of victim officers all handguns		368	40	25	33	46	38	34	36	42	36	38
No. of victim officers killed with own weapons	Total	46	6	5	1	3	4	11	7	6	1	2
Handgun	Total	44	6	5	1	3	4	10	6	6	1	2
	357	3	1	0	0	0	0	1	1	0	0	0
	357 mag.	1	0	0	0	0	0	0	1	0	0	0
	.38	1	0	1	0	0	0	0	0	0	0	0
	.40	22	1	1	1	3	3	5	1	5	1	1
	.45	8	2	0	0	0	1	3	1	1	0	0
	9 mm	8	2	2	0	0	0	1	2	0	0	1
	10 mm	1	0	1	0	0	0	0	0	0	0	0
Rifle	Total	1	0	0	0	0	0	0	1	0	0	0
	.22	1	0	0	0	0	0	0	1	0	0	0
Shotgun	Total	0	0	0	0	0	0	0	0	0	0	0
Blunt Instrument (baton)	Total	1	0	0	0	0	0	1	0	0	0	0

¹FBI Uniform Crime Reports. See <http://www.fbi.gov/ucr/killed/2007/index.html>. Data only reported for jurisdictions greater than 100,000 resident population. UCR reporting is voluntary and not comprehensive nationwide. Does not include private security guards or correctional facility officers.

NSSF Firearms Background Check Data
October 2015



Note: Federal law requires FBI background checks on individuals purchasing firearms from federally licensed retailers. The NICS increase coincides with an increase in federal excise taxes reported by firearms and ammunition manufacturers, another key economic indicator for the firearms industry. Trends such as excise taxes and NICS data are strong indicators of sales patterns; however, they are not actual sales. There is no data source that captures firearms sales by month.