



(51) International Patent Classification:

F41A 3/94 (2006.01) F41A 3/82 (2006.01)
F41A 3/88 (2006.01)

(21) International Application Number:

PCT/US2012/034562

(22) International Filing Date:

20 April 2012 (20.04.2012)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

61/478,053 21 April 2011 (21.04.2011) US

(71) Applicant (for all designated States except US): **MANDUS GROUP, LTD. (A CORPORATION ORGANIZED UNDER THE LAWS OF THE STATE OF IOWA, USA)** [US/US]; 2408 4th Ave., Rock Island, IL 61201 (US).

(74) Agent: **HAMILTON IP LAW, PC;** Hamilton IP Law, PC, 331 W. 3rd St. NVC, Suite 120, Davenport, IA 52801 (US).

(81) Designated States (unless otherwise indicated, for every kind of national protection available):

AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available):

ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

[Continued on next page]

(54) Title: SOFT RECOIL SYSTEM

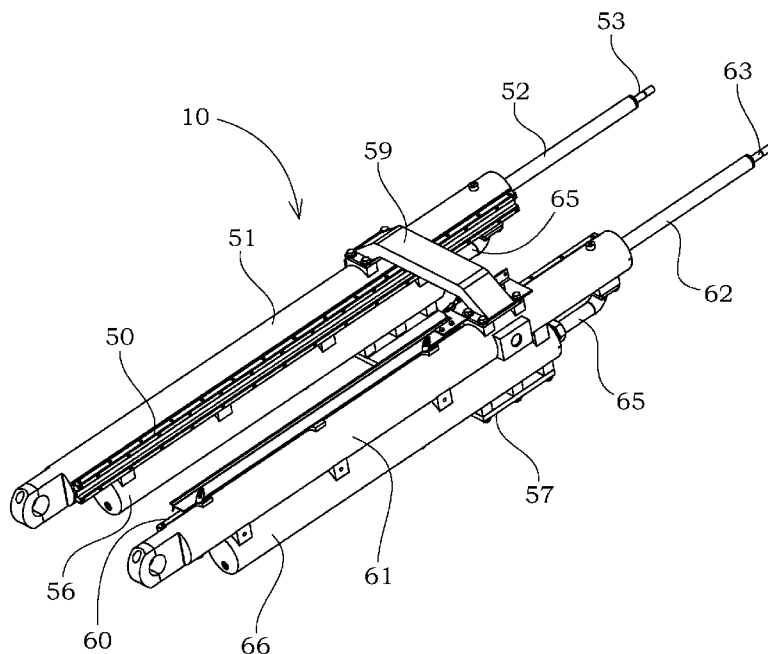


FIG. 3

(57) Abstract: One embodiment of a gun configured with the soft recoil system comprises a plurality of recoiling parts that initially moves in the direction of the projectile being fired before moving in a direction opposite to that of a projectile during the firing of the round. The soft recoil system throttles the movement of the recoiling parts such that the energy expended during the firing of the round is spread over a longer time period and a longer distance than would normally occur. The soft recoil system stores at least a portion of the energy transferred to the recoiling parts and the user may selectively release at least a part of that portion of energy to offset the energy imparted to the gun during the firing of the next round.



Published:

— *with international search report (Art. 21(3))*

(88) Date of publication of the international search report:

28 February 2013

A. CLASSIFICATION OF SUBJECT MATTER*F41A 3/94(2006.01)i, F41A 3/88(2006.01)i, F41A 3/82(2006.01)i*

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

F41A 3/94; F41A 25/00; F42C 11/04; F42C 9/14; B64C 3/51

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean utility models and applications for utility models

Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS(KIPO internal) & Keywords:"recoil", "fluid", "latch", "crank" and "link"

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X A	US 2193446 (CECIL P. CAULKINS) 12 March 1940 See page 1 - page 3; and figure 1.	1-3 4-20
X A	US 1650752 (HARRY C. ZIMMERMAN) 29 November 1927 See page 1 - page 2; and figure 3.	4-9 10-20
A	US 6644168 B1 (BROWNE; JERRY M. et al.) 11 November 2003 See column 4, line 5 - column 9, line 54; and figure 1.	1-20
A	US 6392213 B1 (MARTORANA; RICHARD T. et al.) 21 May 2002 See abstract and figure 1A.	1-20
A	US 05497704 A (KURSCHNER; DENNIS L. et al.) 12 March 1996 See abstract and figure 6.	1-20

 Further documents are listed in the continuation of Box C. See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

30 NOVEMBER 2012 (30.11.2012)

Date of mailing of the international search report

30 NOVEMBER 2012 (30.11.2012)

Name and mailing address of the ISA/KR

Korean Intellectual Property Office
189 Cheongsu-ro, Seo-gu, Daejeon Metropolitan
City, 302-701, Republic of Korea

Facsimile No. 82-42-472-7140

Authorized officer

HAN, JAE SEOB

Telephone No. 82-42-481-5439



Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see the extra sheet

1. As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- No protest accompanied the payment of additional search fees.

<the extra sheet>

GROUP 1

Claims 1-3 are directed to a soft recoil system comprising a plurality of recoiling parts, a first energy transfer media, and an energy storage media.

Claims 4-17 are directed to a hydraulic cylinder comprising an outer cylinder, an inner cylinder, a recoil piston, and an elongated recoil rod and a recuperator having a floating piston.

GROUP 2

Claims 18-19 are directed to a latch mechanism comprising a housing, a latch assembly, a crank, and a link.

GROUP 3

Claims 20 is directed to a method for conserving the energy expended during the firing of a round in a gun using a soft recoil system comprising operably engaging a piston ... said first fluid chamber; using said piston ... of said round; throttling the rate ... of said fluid; and releasing at least ...to said first fluid chamber.

The inventions listed as Groups 1, 2 and 3 do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2 they lack the same or corresponding special technical features for the following reason; they are separate inventions with distinct fields of search.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2012/034562

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2193446	12.03.1940	None	
US 1650752	29.11.1927	None	
US 6644168 B1	11.11.2003	AU 2003-259091 A1 EP 1529192 A1 WO 2004-015354 A1	25.02.2004 11.05.2005 19.02.2004
US 6392213 B1	21.05.2002	AU 2002-230387 A8 AU 2002-30387 A1 US 2003-0089820 A1 US 6576880 B2 WO 02-32762 A2 WO 02-32762 A3 WO 02-32762A3 WO 02-32762A9	29.04.2002 29.04.2002 15.05.2003 10.06.2003 25.04.2002 25.04.2002 08.01.2004 20.02.2003
US 05497704 A	12.03.1996	CA 2139291 C EP 0661516 A1 EP 0661516 B1	27.02.2001 05.07.1995 10.02.1999