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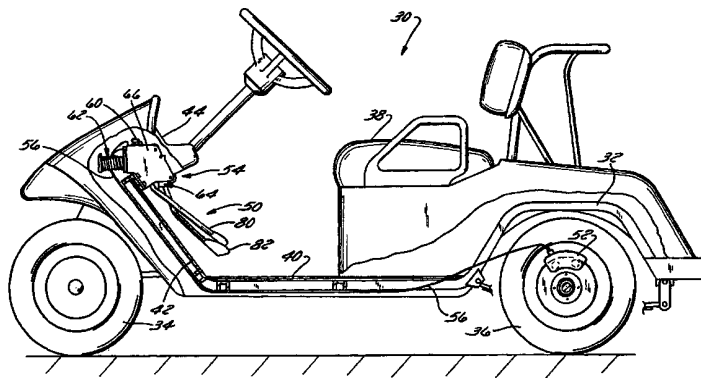
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[Continued on next page]

(54) Title: BRAKE SYSTEM HAVING HYDRAULIC ACCUMULATOR AND/OR COMBINED SERVICE BRAKE AND PARK AND HOLD BRAKE



(57) Abstract: A hydraulic brake system (50) for a vehicle such as a golf car or the like uses the same brakes (52) and same brake pedal (80) for both service braking and park and hold braking. The brakes (52) are selectively engaged, locked in their engaged position, and released using an integrated control assembly including a brake pedal (80), an accelerator pedal (82), and a brake pedal locking mechanism (84). The brake pedal locking mechanism (84) is configured to automatically latch the brake pedal (80) in a locked position thereof and to automatically unlatch the brake pedal (80) from its locked position upon either subsequent movement of the brake pedal (80) into an overtravel position or subsequent actuation of the accelerator pedal (82). In addition, a hydraulic accumulator (62) stores part of the energy generated upon brake pedal depression and consequent manual actuation of a master cylinder (60) of the system to maintain the brakes (52) in their fully engaged state when the brake pedal (80) is latched. The stored energy can also be used to help return an applied brake pedal (80) to its released position, in which case return fluid flow to the master cylinder (60) is damped to avoid undesirable severe kickback of the brake pedal. The accumulator (62) preferably comprises a modular spring and retainer assembly that can be preassembled separately from the remainder of the system and subsequently mounted on the system as a unit.



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INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER
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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)
IPC 7 B60T G05G F16D F15B

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

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4 867 289 A (ELDON E. WOOTERS) 19 September 1989 (1989-09-19) cited in the application the whole document ---	1, 11, 19-21, 30, 31
A	US 5 588 335 A (DANIEL L. STRAIT) 31 December 1996 (1996-12-31) column 4, line 41 -column 6, line 17; figures 1-6 ---	1, 11
A	US 4 076 093 A (AKIRA MIZUNO) 28 February 1978 (1978-02-28) the whole document -----	1, 11, 19-21, 30, 31

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

° Special categories of cited documents :

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- *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

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INTERNATIONAL SEARCH REPORT

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PCT/US 00/05427

Box I Observations where certain claims were found unsearchable (Continuation of item 1 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 II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

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

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.:

1-35

Remark on Protest

- The additional search fees were accompanied by the applicant's protest.
- No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PL 1/US 00/05427

Patent document cited in search report	A	Publication date	Patent family member(s)	Publication date
US 4867289	A	19-09-1989	NONE	

US 5588335	A	31-12-1996	NONE	

US 4076093	A	28-02-1978	JP 1135143 C	14-02-1983
			JP 52118734 A	05-10-1977
			JP 57025415 B	29-05-1982
			JP 52141926 A	26-11-1977
			JP 1135146 C	14-02-1983
			JP 53004926 A	18-01-1978
			JP 57025416 B	29-05-1982
