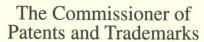
# The United States of America



Has received an application for a patent for a new and useful invention. The title and description of the invention are enclosed. The requirements of law have been complied with, and it has been determined that a patent on the invention shall be granted under the law.

Therefore, this

# United States Patent

Grants to the person(s) having title to this patent the right to exclude others from making, using, offering for sale, or selling the invention throughout the United States of America or importing the invention into the United States of America for the term set forth below, subject to the payment of maintenance fees as provided by law.

If this application was filed prior to June 8, 1995, the term of this patent is the longer of seventeen years from the date of grant of this patent or twenty years from the earliest effective U.S. filing date of the application, subject to any statutory extension.

If this application was filed on or after June 8, 1995, the term of this patent is twenty years from the U.S. filing date, subject to any statutory extension. If the application contains a specific reference to an earlier filed application or applications under 35 U.S.C. 120, 121 or 365(c), the term of the patent is twenty years from the date on which the earliest application was filed, subject to any statutory extension.

Toda I Joh

Mayaire V. Jurner



# United States Patent [19]

Jen et al.

[56]

[11] Patent Number:

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[45] Date of Patent:

Sep. 7, 1999

# [54] MULTI-FUNCTIONAL TEST MACHINE

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[52]	U.S. Cl	73/856; 73/857; 73/796
	Field of Search	73/856, 857, 859
• •		73/860, 796, 853

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#### Primary Examiner-Max Noori

# [57] ABSTRACT

A multi-functional test machine is provided. The machine includes a frame with a pair of upright columns parallel extended upward from a foundation, an upper crosshead system slidably engaged on the columns and actuated by a pair of hydraulic jacks butting the columns, a ball bearing suspending from a hollow sphere casing in the upper crosshead system to connect with an upper specimen grip and fastened by a plurality of hydraulic buckles, a lower crosshead system fixed to a lower part of the columns including a rotatable hydraulic cylinder and a linear hydraulic cylinder disposed in alignment in the system to rotatably or slidably actuate a actuator shaft to which a lower specimen grip is engaged so that the test machine in capable of self-alignment and carrying out both torsion and tension-compression test for a specimen, this disclosure further includes a series of detective apparatus such as stress sensors, rotatable and linear displacement detectors which send the tension and displacement information of the specimen grips to a computer and automatically make stress compensations to the upper specimen grip.

### 14 Claims, 6 Drawing Sheets

