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PATENT APPLICATION

VARIABLE-VOLUME ENGINE

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16. Abstract

A description is given of an engine using the expansion-contraction of bodies subjected to controlled thermal variations and making use of free natural heat sources.

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HANDWRITTEN NOTE FROM THE AUTHOR:

Gentlemen:

I have no available means for building this variable-volume engine.

signed

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(NATIONAL INSTITUTE FOR INDUSTRIAL PROPERTY)

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REQUEST FOR A PATENT National Registry Number: 77 35813 Requested on: 9 November 1977	Mr. Stéphane CONVERS 52 Boulevard Serurier 75019 Paris		
Your reference:	Person(s) Giving Evidence: A: name and first names or title; B: nationality C: Address		
(A) Stéphane René Convers (B) French (C) 52 Boulevard Serurier, 75109 Paris			

Name of the Invention - followed by the Name and First Names of the inventor (s) if applicable: Convers Variable-Volume Engine

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REQUEST DATE	CONVENTIONAL PRIORITIES Type, country, number and name of the original applicant

Attachment of the Certificate of Addition			
Nature of the main title to which the certificate of addition is attached		#	Date requested:
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ABSTRACT OF THE TECHNICAL CONTENTS OF THE INVENTION

Engine using the expansion-contraction of bodies subjected to controlled thermal variations and making use of free natural heat sources and/or man-made recovery heat sources.

It includes: first, one or more devices designed to transmit, either directly or through concentration, thermal energy to a material whose expansion provides the first driving element; second, one or more devices designed to interrupt the addition of heat to the above material whose contraction provides the second driving element; and third, as an option, one or more cooling devices to accelerate the contraction phase. The frequency of the expansion-contraction cycle varies in speed depending on the devices and materials used for specific applications.

These applications are all those requiring an engine.

DESCRIPTION

Convers Variable-Volume Engine.

This invention relates to the exploitation of free natural heat sources and/or of man-made recovery heat sources.

The exploitation of free natural heat sources (solar-thermal and geothermal) and the exploitation of man-made recovery heat sources have already given birth to many apparatus for domestic, agricultural and industrial usage such as solar ovens, geothermal syphons, temperature-control of fields and greenhouses near factories, etc. While these devices are first of all heating apparatus, the same heat sources are used in this invention to drive an engine.

Hence, it becomes possible to operate all sorts of machines inexpensively.

Building the engine covered by this invention includes three aspects: the selection of the thermal energy source, the devices to apply this thermal energy to the body subjected to the expansion/contraction cycle, and the physical and chemical characteristics of the body subjected to the expansion/contraction cycle.

As to the choice of the thermal energy source, this invention applies not only to all expensive traditional sources (fires using wood, coal, hydrocarbons; electrical power from thermal, hydraulic and atomic sources; etc.), but also in particular to the free natural heat sources (solar and geothermal) and to the man-made recovery heat sources (from factories, urban heating, etc.). This invention covers the single or combined use of the sources mentioned above depending on the location of the variable-volume engine. Thus, an area with much sunshine can prefer solar heat energy, a volcanic area geothermal heat, a coastal area the energy furnished by a warm sea current. Industrialized and urbanized areas will have available many man-made recovery heat sources. Very naturally, a spacecraft will use solar heat while a ground, water or air vehicle will instead resort to traditional sources.

Devices for applying thermal energy to the body subjected to the expansion/contraction cycle involved in this invention include in their complete configuration four active stages: the concentrator stage, the collector stage, the conductor stage and the cooling stage.

As an example of a concentrator stage we will mention, for solar heat, sets of mirrors and/or heliostatic magnifying glasses; as an example of a collector stage, we will mention absorbent metallic plates of any material, shape, configuration, color, etc. that make it possible to absorb the maximum amount of energy concentrated by the preceding stage; as an example of a conductor stage, we will mention insulated liquid columns or metallic rods; finally, as a cooling stage, we will mention the example of a water line if the variable-volume engine is located near a natural or artificial source of this liquid.

Each of these stages can be equipped with a sub-device with the purpose of interrupting heating or cooling. Nevertheless, the conductor stage is the most likely to have the interruptor sub-device as heating can, at this stage, be easily replaced by cooling and vice-versa.

For all bodies subjected to the expansion/contraction cycle, this invention applies to all bodies that are simple or compound, organic or inorganic, and pure or mixed, all alloys, mixtures, combinations, etc., of any kind, in any state or phase that it might be in, in any state or phase change that it might be in, to the extent that these bodies have a specific heat/expansion coefficient ratio that provides as much expansion and contraction as possible for an amount of heating or cooling as low as possible.

In the case of expansion of bodies passing from the liquid state to the gaseous state and in the case of contraction of the same bodies returning to the liquid state, the variable-volume engine particularly calls for bodies with a boiling point between the temperature of the stopped non-heated engine in the expected environment and the temperature that the type of thermal energy under consideration can provide to the engine. Thus, acetone which boils at 56°C is especially well-suited to variable-volume engines operating in countries where the temperature in the shade is about 40°C and the temperature in the sun is about 70°C.

To continue, here are a few examples of variable-volume engines that illustrate, in a non-exhaustive manner, a few possibilities among the practical approaches covered by this invention.

Example #1. Plate 1/3, Figures 1, 2, and 3.
A chassis (1) supports a metal rod (3) held in place at one of its two ends by a fixed support (2). At the other end, the rod has a rack (4a) engaging a pinion (4b). The expansion/contraction cycle of the rod is converted into a back-and-forth motion of the rack imparting a rotation to the pinion, first in one direction and then in the other. This alternating rotation is made usable by means of a connecting rod (4c). The cyclical heat interruption is accomplished by means of a retractable shield (5) equipped with bearings (6). The shape of the rod, its hollow or solid make-up, the type of metal or alloy from which it is made, its dimensions, etc., as well as the shape, make-up, nature, dimensions, pitch, etc., of the rack vary according to the expected application.

Example #2. Plate 2/3, single Figure.

Example #2. Plate 2/3, single figure.

A cylinder made from two sliding bells (5a, 5b) with insulated walls and airtight seals (5c) is filled with a fluid (3) whose expansion caused by the heat captured (1) and transmitted to it (2) increases the volume of the cylinder while its contraction caused by cooling (6a, 6b, and 6c) decreases this volume. This cylinder, immersed into a carrier fluid (4) contained within a tank, rises and descends within it by following a guidance device composed of rods (7a), bearings (7b) and stops (7c). The motion obtained is used by means of a shaft (9) and a connecting rod (10).

Example #3. Plate 3/3, single figure.

An accordion-type device (3) that is guided (4) contains 14.5 liters of acetone (5) at 50°C (boiling point of 56°C considered as constant as pressure remains low within the given limits). By heating it to 80°C (collector stage 1 and collector stage 2) and then by cooling it to the original temperature (cooling stage 6a, 6b, and 6c), the expansion after passing to the gaseous stage and the contraction after returning to the liquid stage make it possible to displace in each direction (for example, by means of the shaft (8) attached to the cap (7) and driving the connecting rod (9)) a 75kg weight over a distance of 1 meter. The power of the engine will be a function of the time taken to complete the cycle adding and then removing the heat needed to perform the work measured.

CLAIMS

1. The variable-volume engine is unique in that it used the expansion/contraction cycle of bodies subjected to controlled thermal variations (these bodies being any that are simple or compound, organic or inorganic, pure or mixed, alloys, mixtures, combinations, etc. of any kind), in whatever phase or state it may be in, and in any state or phase change. The engine has a specific heat/expansion coefficient that makes it possible to obtain an expansion and a contraction as large as possible for an amount of cooling and heating as low as possible.

2. The variable-volume engine, according to claim 1, is unique in that it can take advantage, in addition to expensive traditional sources of heat, of all

free natural heat sources and/or all man-made recovery heat sources.

3. The variable-volume engine, according to claim 1, is unique in that it includes a stage to concentrate thermal energy.

4. The variable-volume engine, according to claim 1, is unique in that it includes a stage to collect thermal energy.

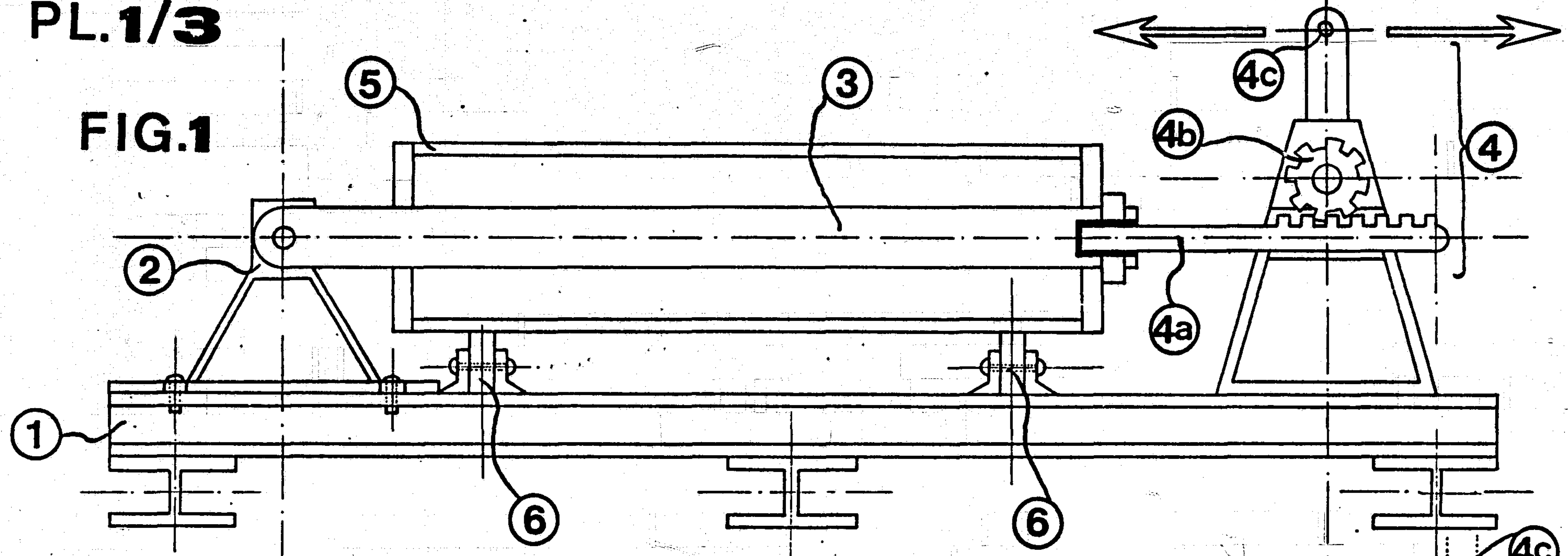
5. The variable-volume engine, according to claim 1, is unique in that it includes a stage to conduct thermal energy.

6. The variable-volume engine, according to claim 1, is unique in that it can include a cooling stage.

7. The variable-volume enigne, according to claims 3, 4, 5, and 6, is unique in that it includes a sub-device or several sub-devices to interrupt heating. These can be located at the concentrator stage and/or the collector stage and/or the conductor stage, but preferably at the latter stage. The engine also includes one or several sub-devices located at the cooler stage. to interrupt cooling.

PL.1/3

FIG.1



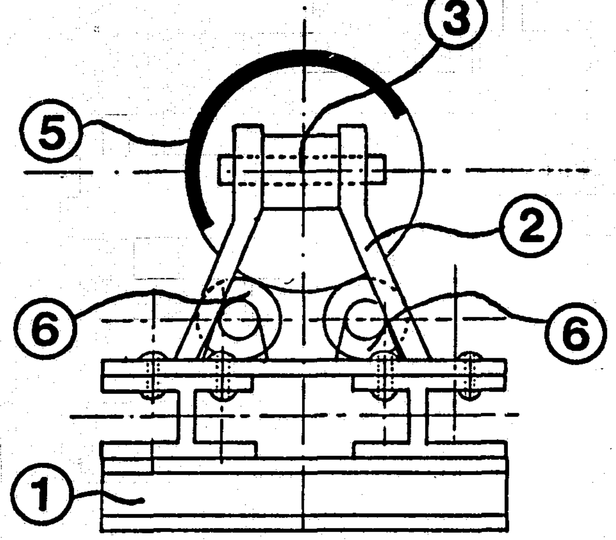


FIG.2

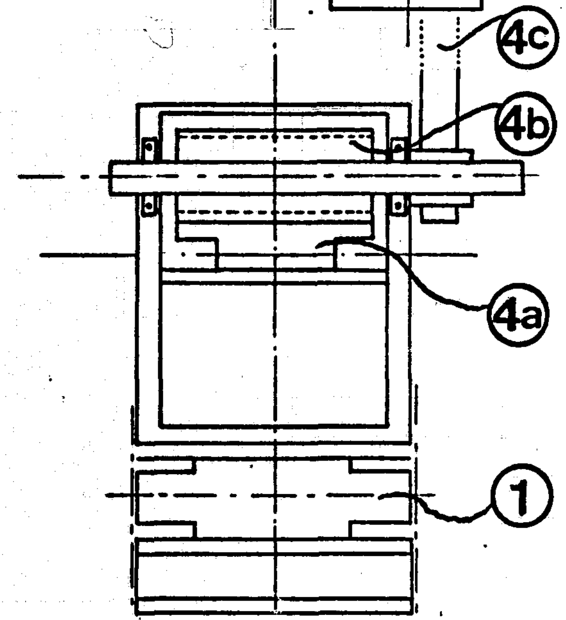
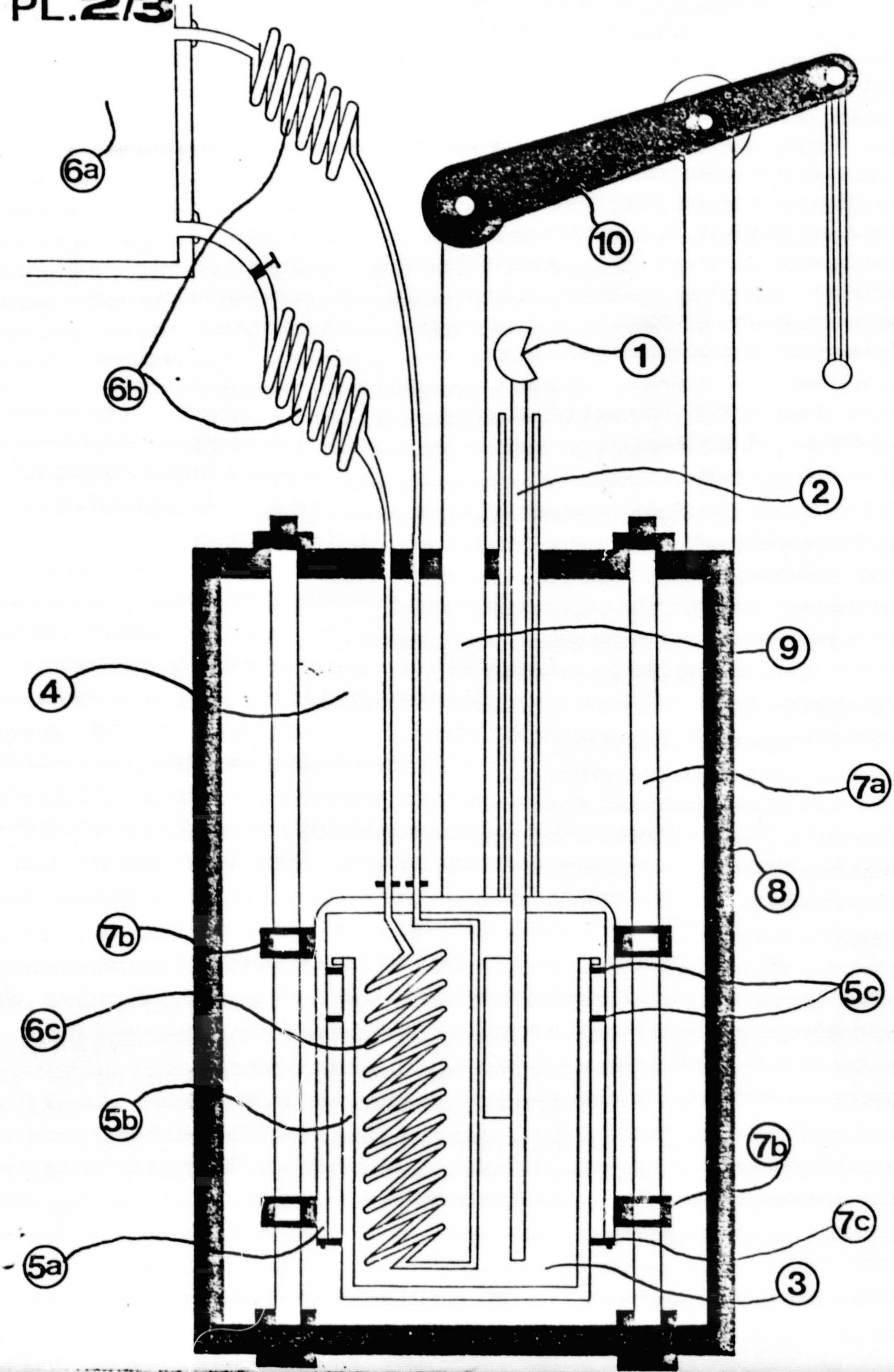
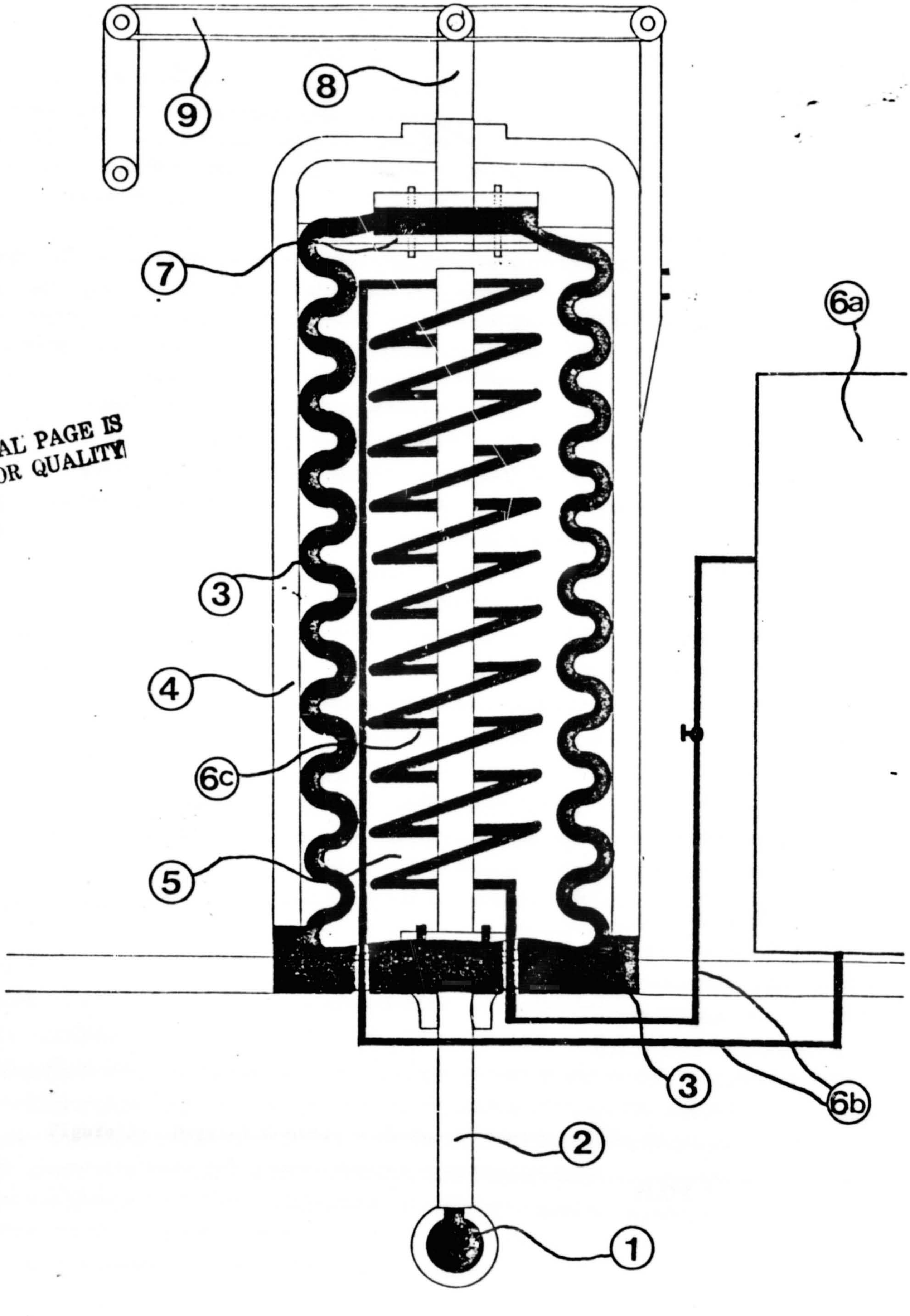


FIG.3

PL.2/3

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6a
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6c
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6b
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