

We claim:

1. An emergency start-up method for an energy generator set (81) by coupling one pyrotechnic gas combustion generator with a positive displacement transmission motor automatic coupling to said energy generator set or uncoupling from said energy generator set, characterised in that, if an emergency start-up situation for the set is detected, at least one pyrotechnic gas combustion generator (5) is triggered, pressurised gases then being generated by this combustion and injected directly into a positive displacement motor with gear wheels (1, 100, 101, 102), in that a portion of these gases rotate (Ra, Rb) the gear wheels (3a, 3b) of the motor and, simultaneously, the remaining portion of the gases projects a first connection means driven in rotation by the positive displacement motor toward a second connection means driving in rotation the energy generator set, thereby establishing a coupling connection (8a to 8c; 18, 19, 7, 170) which couples the motor (1, 100, 101, 102) to the energy generator set (81), against a restoring force (9) exerted by a return spring on one of the first or second connection means, the connection (8a to 8c; 18, 19, 7, 170) bringing about the transmission of energy by rotating a gear shaft (4b, 40b; 500) of the positive displacement motor (1, 100, 101, 102) on a driven shaft (61, 82) of the set (81), and in that, when the thrust (F1, F6) falls below the restoring force, the return spring exerts a restoring force that automatically repels said one of the first or second connection means so that the connection (8a to 8c; 18, 19, 7, 170) is broken and the set (81) is uncoupled from the positive displacement motor (1, 100, 101, 102).

2. The emergency start-up method as claimed in claim 1, wherein the coupling connection (8a to 8c; 18, 19, 7, 170) between the gear shaft (4b, 40b; 500) and the driven shaft (61, 62, 82) of the set to be restarted (81) is produced by friction.

3. The emergency start-up method as claimed in the preceding claim, wherein the remaining gases are injected into the positive displacement motor peripherally (E2) about the longitudinal axis (X'X) so that the coupling connection (8a to 8c) uses radial compression (F2) to rotate the shaft (61, 82) of the set to be restarted.

4. The emergency start-up method as claimed in claim 2, wherein the remaining gases are injected into the positive displacement motor centrally (4A) along the longitudinal axis (X'X) so that the coupling connection (18, 19, 7, 170) uses conical coupling to rotate the shaft (62) of the set to be restarted.
5. The emergency start-up method as claimed in any of the preceding claims, wherein successive instances of pyrotechnic gas combustion generation are triggered.
6. The emergency start-up method as claimed in claim 2, wherein the restoring force is generated by means chosen from elastic force, electromagnetic force and expansion of a compressed fluid.
7. The emergency start-up system (10) for an energy generator set (81) configured to implement an emergency start-up method for an energy generator set as claimed in any of claims 1 to 6, wherein it comprises at least the pyrotechnic gas generator (5) connected to an electrical initiator (3), said electrical initiator being connected to a computer, the positive displacement motor (1, 100, 101) comprising a casing (2, 120) defining an internal space (E1, E11) housing gear wheels, or straight-cut (3a, 3b), the pyrotechnic gas generator (5) being coupled to the positive displacement motor (1, 100, 101) by a gas inlet (21, 121) in the casing (2, 120), in that the positive displacement motor (1, 100, 101) includes the first connection means (8a to 8c; 18, 19), configured to move at one end of a drive shaft (4b, 40b, 500) centred about a gear-wheel axis (X'X) of the positive displacement motor (1, 100, 101), configured to achieve the coupling connection between said drive shaft of the positive displacement motor and a driven shaft (61, 62, 82) of the energy generator set (81) via a centrifugal clutch (7, 170), and in that a the return spring (9, 90) arranged in abutment (41F), is configured to exert the restoring force against pressure (F1, F6) exerted on the first or second connection means (8a to 8c; 18, 19) by the pressurized gazes to break the coupling connection.

8. The emergency start-up system as claimed in the preceding claim, wherein the ferrule (8b) is composed of at least an open annular portion, which is moved aside radially by sliding along a conical portion (41) of the drive shaft (4b) of the positive displacement motor (1).

9. The emergency start-up system as claimed in claim 8, wherein a conduit (140; 14L, 14R) connected to the gas inlet (121) of the casing (120) communicates with a central bore (4A) of the drive shaft (40b) to allow some of the gases coming from the pyrotechnic gas generator (5) to circulate as far as the connection means (18, 19), this connection means including the piston, configured as a conical piston (18), which is configured to be moved in translation by the thrust (F6) of said some of the pressurized gases along an axis (X'X) of the drive shaft (40b) of the positive displacement motor (100), so as to become housed in a tapered bore (18L), rigidly connected to the centrifugal clutch (170), in order to drive it by friction.

10. The emergency start-up system as claimed in any of claims 8 to 9, wherein the electrical initiator includes an electronic unit (3) having an autonomous electrical power source (31), and an electronic control board (32) incorporating a heat-sensitive component (33) and a microcontroller (34) for managing the electrical power source (31), the heat-sensitive component (33), functional self-tests and alarms for triggering an ignition cartridge (52) of the pyrotechnic gas generator (5).

11. The emergency start-up system as claimed in any of claims 8 to 10, wherein the gear wheels of the positive displacement motor (1, 100, 101, 102) are spur pinions (3a, 3b).

12. The emergency start-up system as claimed in any of claims 8 to 11, wherein if the set is a turbine engine (81) having a shaft (82) of an high pressure spool (80), the driven shaft is chosen from a shaft (61, 62) of an accessory gearbox (71) mounted on the high pressure spool (80), a bell housing (7, 170) rigidly connected to a pinion of the

accessory gearbox (71) and used as a centrifugal clutch (7, 170), or the shaft (82) of the high pressure spool (80).

Dated this 22nd day of October, 2014



[ANUPAM]

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ATTORNEY FOR THE APPLICANT

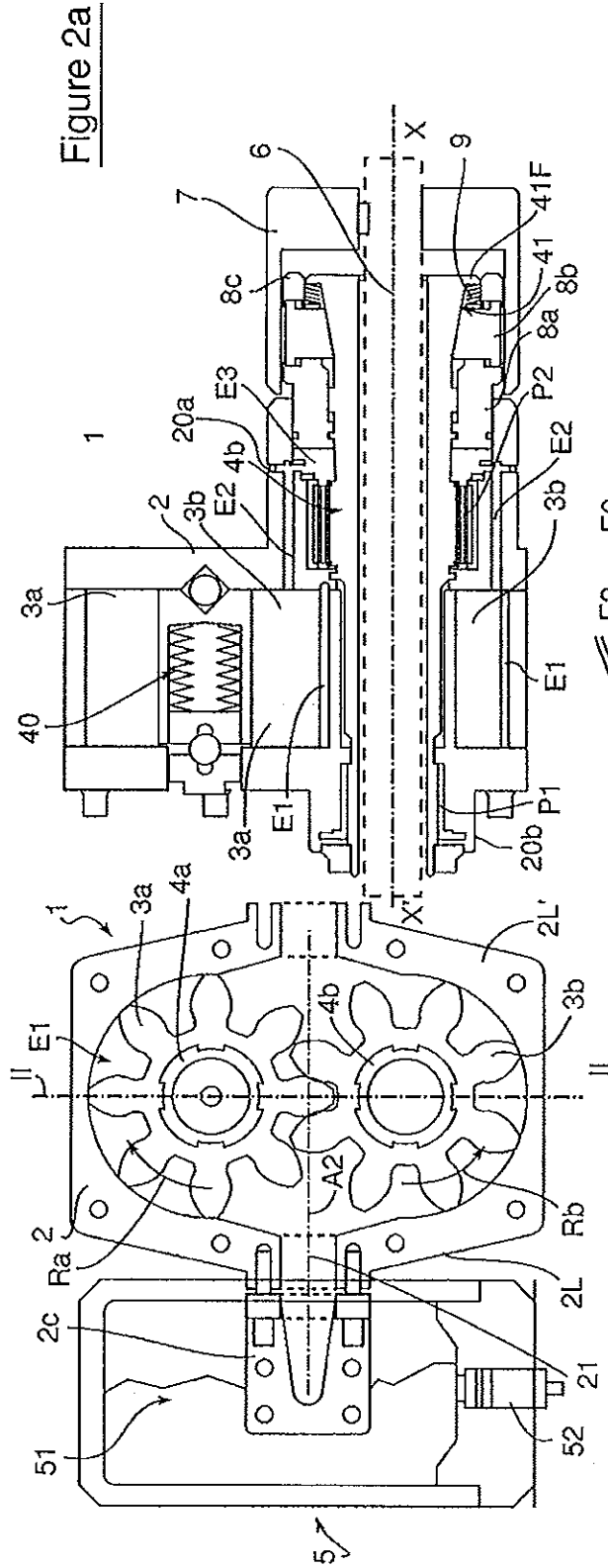


Figure 1

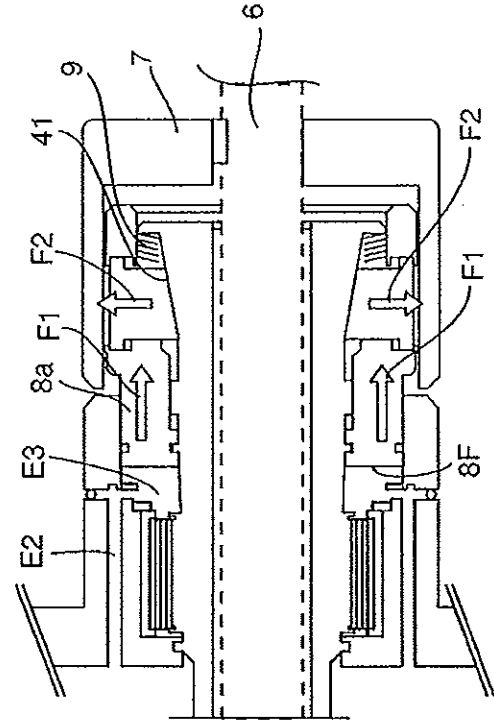


Figure 2b

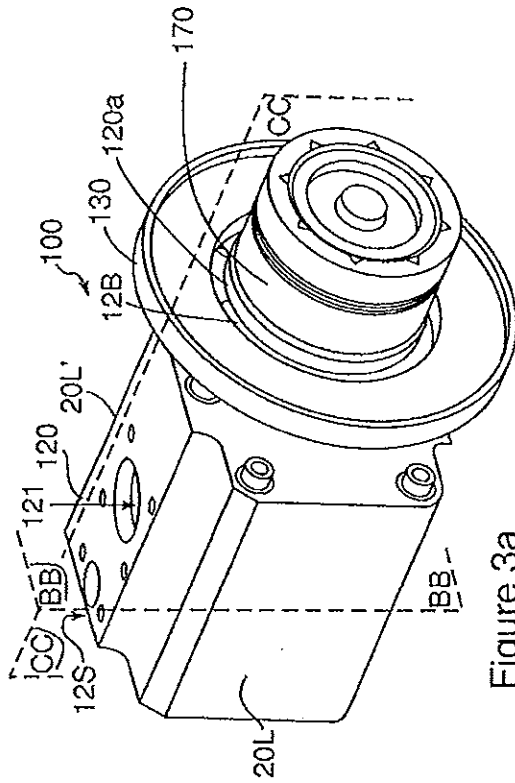


Figure 3a

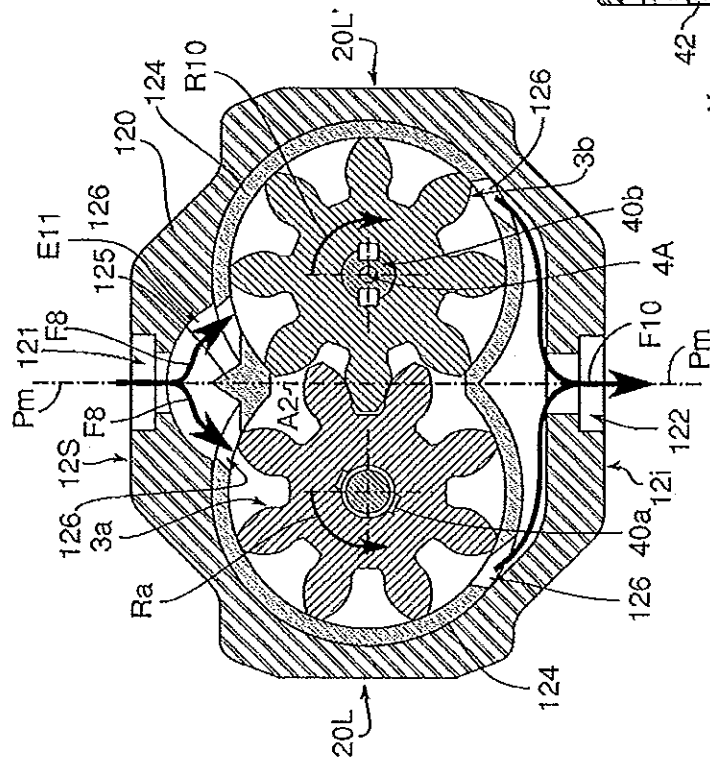


Figure 3b

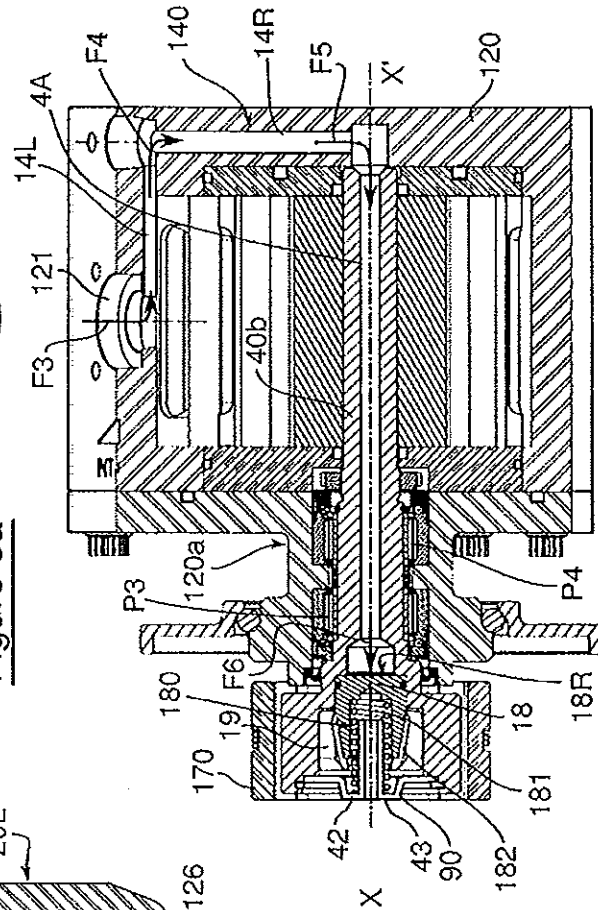
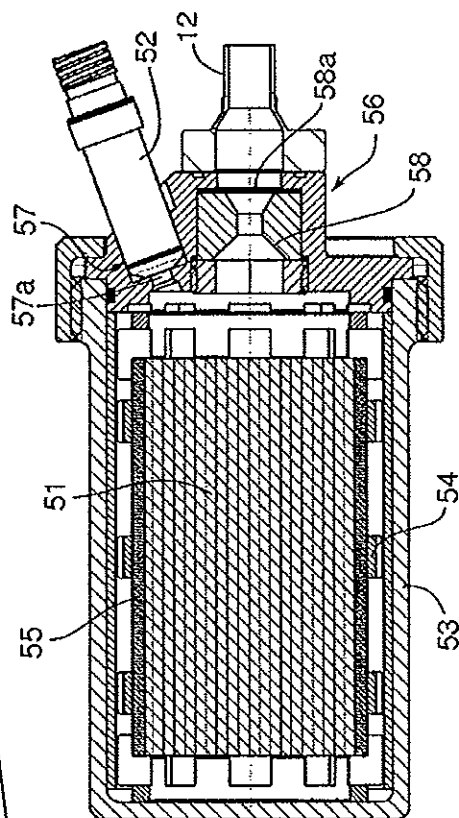
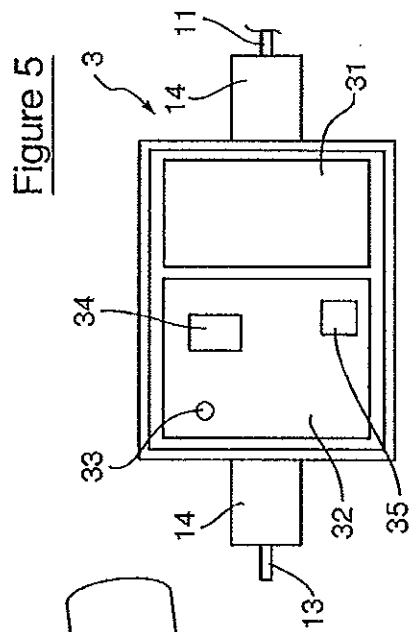
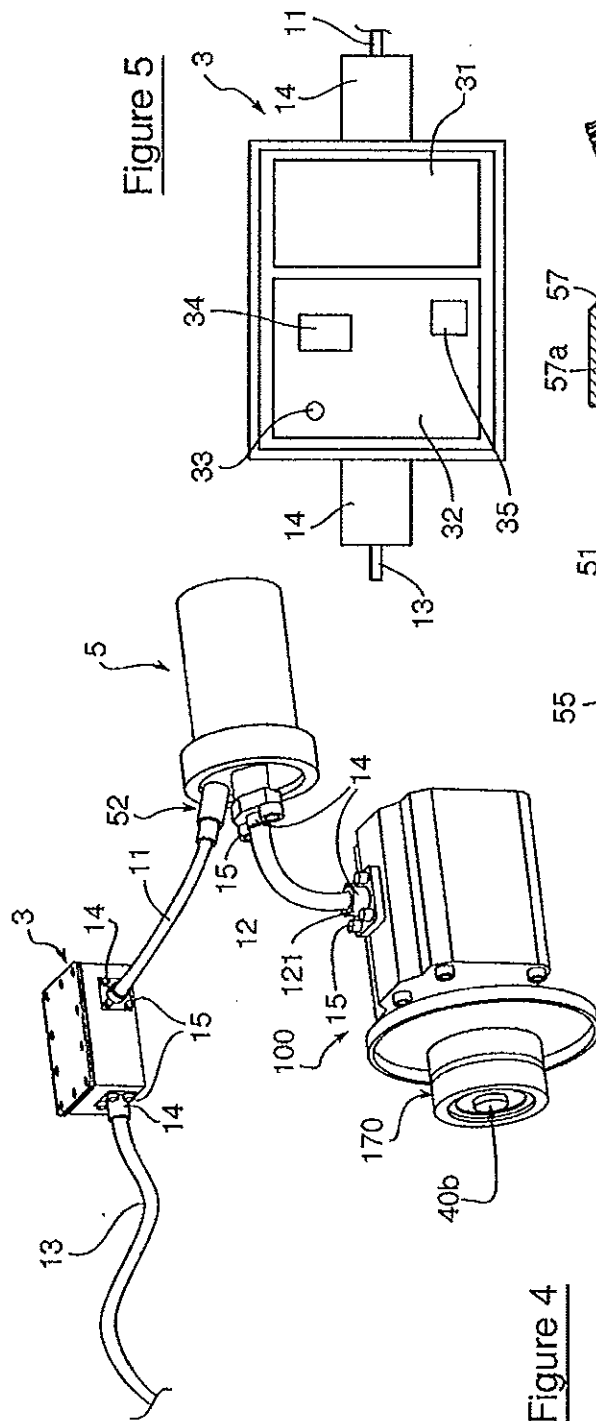
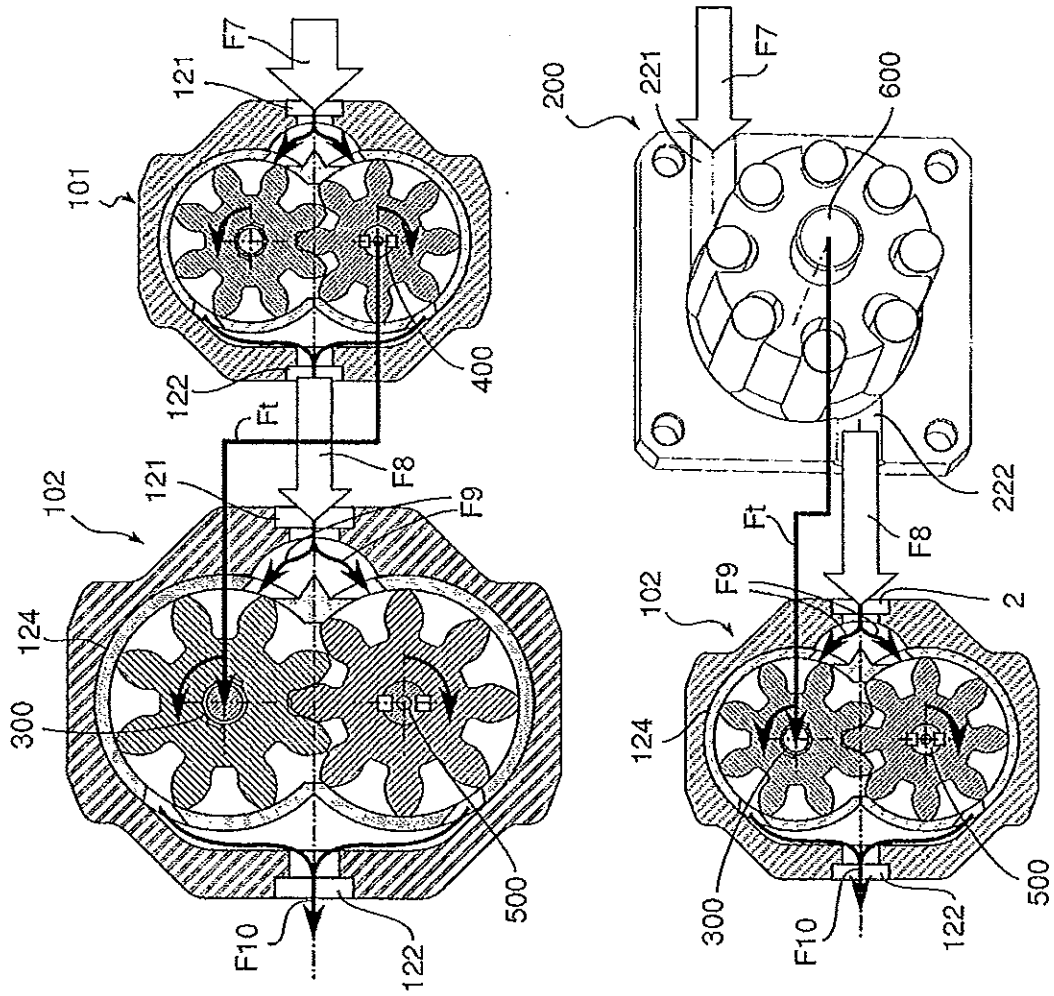


Figure 3c





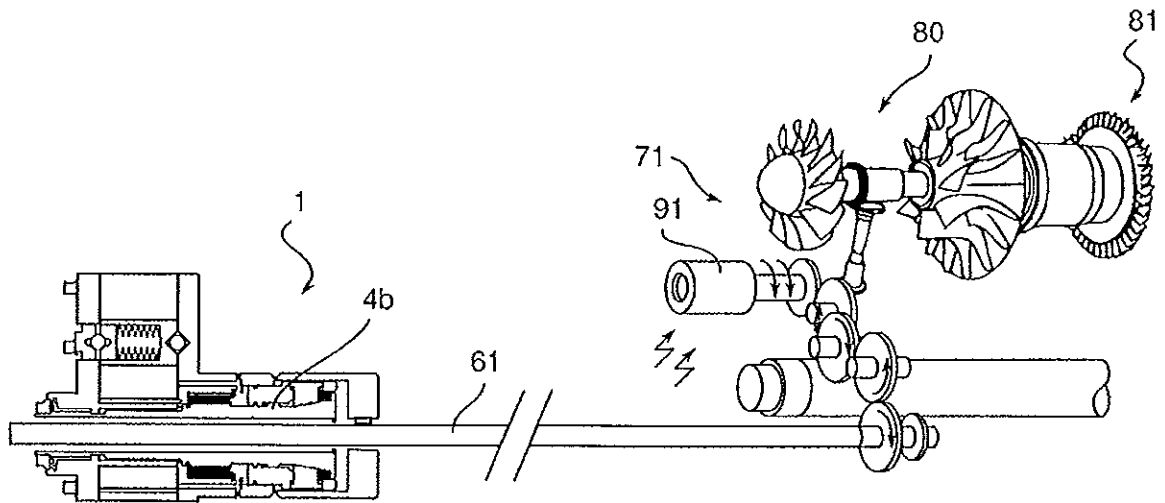


Figure 8a

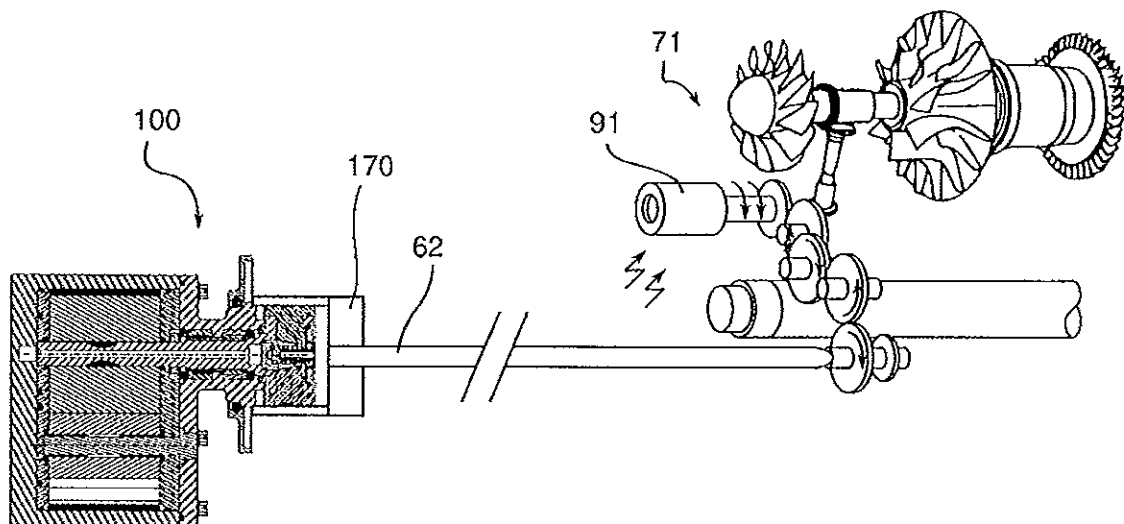


Figure 8b

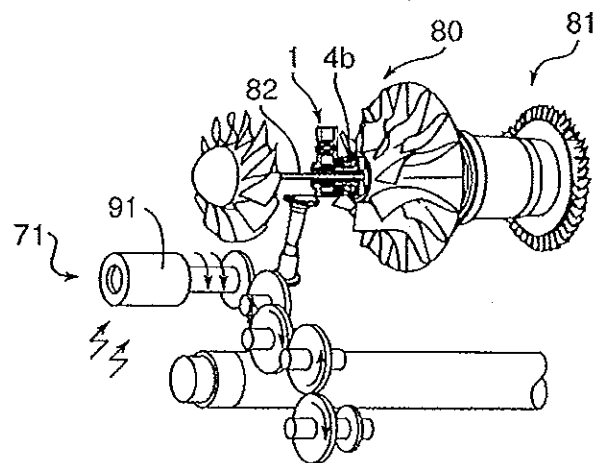


Figure 8c

FORM 2
THE PATENTS ACT, 1970
[39 OF 1970]
&
THE PATENTS (AMENDMENT) RULES, 2006
COMPLETE SPECIFICATION
[See Section 10; rule 13]

“METHOD AND SYSTEM FOR THE EMERGENCY START-UP OF AN ENERGY
GENERATOR SET”

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The following specification particularly describes the invention and the manner in which it is to be performed: