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(11) **EP 0 805 195 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention
of the grant of the patent:
18.09.2002 Bulletin 2002/38

(51) Int Cl.7: **C10M 175/00**

(21) Application number: **97500076.1**

(22) Date of filing: **24.04.1997**

(54) **Used lubricating oil electric power generating process and facility**

Verfahren zum Erzeugen von elektrischer Energie durch gebrauchte Schmieröle und Anlage dafür
Procédé pour générer de l'énergie électrique à partir d'huile lubrifiante usagée et installation pour sa
mise en oeuvre

(84) Designated Contracting States:
DE DK GR NL PT SE

(30) Priority: **29.04.1996 ES 9600967**

(43) Date of publication of application:
05.11.1997 Bulletin 1997/45

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EP-A- 0 757 091 **WO-A-94/11471**

- **DATABASE WPI Section Ch, Week 9417 Derwent Publications Ltd., London, GB; Class H06, AN 94-137749 XP002044870 & ES 2 049 166 A (PRISMA PROMOCION IND SERV MEDIOAMBIENTAL) , 1 April 1994**

EP 0 805 195 B1

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Description**OBJECT OF THE INVENTION**

[0001] The present invention relates to a used lubricating oil electric power generating process with which the lubricating oils are successfully transformed into a light fuel product capable of supplying classic diesel combustion high-speed motors of the kind used in a conventional electric power production motor-generator set.

[0002] The invention also concerns the facility for putting said process into practice.

BACKGROUND OF THE INVENTION

[0003] Present-day consumption of lubricating oils for both automation and industrial uses is very significant. Said consumption in Spain actually stands at some 500,000 T/year, which poses a serious ecological problem because such oils are largely illegally incinerated or simply dumped uncontrolledly, with the resulting environmental damage.

[0004] In an attempt at avoiding this problem, treatment plants are known for oils of this kind, capable of regenerating the used oil by means of centrifugation and filtration techniques, which allow a heavy fuel to be obtained and used as fuel in supplying medium-speed diesel motors for obtaining electric power.

[0005] The main shortfalls of these systems lie in that, since a low-quality fuel is obtained, namely heavy fuel, diesel motors especially designed to work with heavy fuel must be used, which consequently has a negative environmental and economic impact.

[0006] The closest known prior art lies in the Spanish patent ES-2049166 which discloses a process for generation of electrical energy from used oils by refining and use as fuel in diesel engine coupled to electrical generator.

[0007] This invention does not refer to a cracking treatment, but to a process wherein a filtering, separation and flocculation steps are carried out.

[0008] International patent application WO 94/11471 reveals a process for converting waste motor oil to diesel fuel, wherein the used motor oil is cracked under certain range of cracking temperature, with the cracking process promoted by the presence of suspended metal particles generated by engine wear. The problem to be solved in this invention is related to the provision of a process for converting used motor oil into a diesel fuel following a low temperature cracking process (520-650°F).

DESCRIPTION OF THE INVENTION

[0009] The process proposed by the invention fully solves the problems aforesaid by refining the oil in such a way that a light fuel may be ultimately obtained with a

high calorific power, which may be used directly to supply high-speed diesel type motors, of the kind used in small and therefore cheaper electric power production motor-generator sets.

[0010] More specifically and in order to achieve the above, the process subject hereof relies upon putting an oil refining into practice that is based upon submitting the oil to a heating capable of causing it to crack, thereby for heavy to be separated from light hydrocarbons and for the polluting elements contained in the oil to be precipitated, and for obtain a light fuel without any contaminants to be ultimately obtained.

[0011] This means that the used lubricating oil will always be confined within the system, without generating any spills and therefore reducing environmental pollution to a minimum.

[0012] A facility has been devised to put this process into practice that includes a used oil receiving and discharging unit, an oil storage yard, an oil treatment plant, an electric power generating station and a similarly electric transformation centre, from which the power is sent out to be consumed.

[0013] More specifically, from the used oil receiving and discharging area, provided with the appropriate receiving tank, the oils are pumped to dirty oil tanks from which the oil is moved onward by pumps to be treated, whereupon light diesel oil is obtained and stored in tanks to ultimately, either directly or through auxiliary tanks, move into the supply system established at the electric power production plant, which is fitted with a battery of motor generators responsible for producing electric power that is sent on to the relevant consumption centre or to the network through the transformation centre.

[0014] Provision has been made for the existence of a small auxiliary tank, capable of supplying the power production plant in the event that there should be no useful fuel obtained through the process of the invention.

DESCRIPTION OF THE DRAWINGS

[0015] In order to provide a fuller description and contribute to the complete understanding of the characteristics of this invention, a set of drawings is attached to the specification which, while purely illustrative and not fully comprehensive, shows the following:

Figure 1.- Is a flow diagram showing the used lubricating oil power generating process subject of the present invention.

Figure 2.- Is a schematic plan view of the facility for putting the process of the preceding figure into practice.

Figure 3. Is, finally, an enlarged and likewise schematic close-view of the generating station or power production plant.

PREFERRED EMBODIMENT OF THE INVENTION

[0016] With reference to these figures, it will be apparent that the used oils, which may originate in the automotive sector, or be industrial lubricants or train, ship and other oils, and may contain the usual additives such as antioxidants, thickeners, detergents, antifoamants and metal particles from metal-metal friction, residual petrol or diesel oil, rust, soot and water, arrive at the receiving and discharging area (1), usually carried by tankers (2) and, having been suitably weighed, are discharged with the assistance of pumping units (3) and caused to enter a receiving tank (4), from which samples are taken to check their quality and whether they should be accepted or rejected at the facility.

[0017] After being accepted, the oil is pumped from the tank (4) to dirty oil tanks (5), for instance having a capacity of some 250 m³, moving onward from such tanks (5) and with the assistance of the said pumping unit (3), to be treated at a plant (6), at which it is refined by cracking. After this plant (6) refining stage, the oil moves on to tanks (8) where the resulting product, namely light diesel oil, is momentarily stored to be used for producing electric power.

[0018] This same storage yard, marked (9) in figure 2, also has a small tank (10) of suitable capacity to supply the electric power production plant (11) when no useful fuel obtained through the treatment of this invention is available.

[0019] From the storage tanks (8), the resulting fuel is pumped to auxiliary tanks (12), existing at the power production plant (11), each of which in turn supplies a battery of motor generators (13) which produce electric power that is sent to the network through a transformation centre (14) in which the appropriate high tension transformers are arranged.

[0020] Now, therefore, in accordance with the foregoing, the essence of the invention lies in obtaining a light diesel oil, capable of directly supplying the high-speed combustion motors (13) used in electric power production generating sets.

Claims

1. A used lubricating oil electric power generating process, **characterised in that** the following operative stages are established in the process:

- Receiving, discharging, checking and accepting or rejecting the oils in accordance with their quality.
- Pumping the accepted oil towards a treatment plant at which the oils are refined using any process which, by cracking, yields a light fuel capable of being used in high-speed diesel combustion motors.

- Pumping the refined oil towards a storage yard from which it is finally used as a light fuel to supply electric power producing motor generators.

- 5 2. A facility for putting the used lubricating oil electric power generating process of claim 1 into practice, **characterised in that** the same includes a discharge platform (1) for the tankers (2) transporting or collecting the oils, which are assisted by a pumping unit (3) that propels the oil towards a receiving tank (4) arranged before a number of tanks (5) for accepted dirty oil, established in a storage yard (9) in which the tanks (8) for storing the refined product are also established, connected to a plant (6) where oil is treated or refined, by cracking, which receives dirty oil from the tanks (5) and sends it to the storage tanks (8) that work with a number of auxiliary tanks (12) that are established at the electric generating station (11) and are in charge of supplying respective batteries of motor generators (13), which supply electric power to the distribution network through an electric transformation centre (14).
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- 25 3. A facility for putting the used lubricating oil electric power generating process into practice, as in claim 2, **characterised in that** the oil storage yard (9) has an auxiliary tank (10) of suitable capacity to be able to supply the motor generators (13) in the absence of useful fuel obtained through the process.

Patentansprüche

1. Verfahren für die Erzeugung elektrischer Energie aus gebrauchtem Schmieröl, im wesentlichen **dadurch gekennzeichnet, dass** in diesem folgende Betriebsphasen vorgesehen sind:

- Aufnahme, Abgabe, Prüfung und Annahme oder Zurückweisung des Öls je nach Qualität.
- Pumpen des angenommenen Öls zu einer Aufbereitungsanlage, wo die Raffination des Öls vorgenommen wird, mit Hilfe irgendeines Verfahrens, in dem durch Cracking ein leichter Brennstoff gewonnen wird, der in schnellen Dieselvebrennungsmotoren verwendet werden kann.
- Pumpen des raffinierten Öls zu einer Lageranlage, von wo aus es schliesslich als leichter Brennstoff für die Versorgung von Motorgeneratoren für die Erzeugung elektrischer Energie verwendet wird.

2. Anlage für die Durchführung des Verfahrens für die Energieerzeugung aus gebrauchtem Schmieröl nach Anspruch 1, **dadurch gekennzeichnet, dass** in dieser ein Abladeplatz (1) für die Tankwägen (2) für den Transport oder die Abholung des Öls vorge-

sehen ist, mit denen eine Pumpeneinheit (3) zusammenarbeitet, die das Öl in einen Aufnahmebehälter (4) befördert, der einer Reihe von Behältern (5) für das angenommene Altöl vorgeschaltet ist, wobei letztere in einer Lageranlage (9) vorgesehen sind, in dem auch die Lagerbehälter (8) des raffinierten Produkts angeordnet sind, die mit einer mit Crackingverfahren arbeitenden Aufbereitungs- oder Raffinationsanlage (6) verbunden sind, in der das Altöl aus den Behältern (5) angeliefert wird und von wo aus dieses zu Lagerbehältern (8) befördert wird, mit denen eine Reihe von Versorgungsbehältern (12) zusammenwirken, die in dem Kraftwerk (11) vorgesehen sind, die die jeweiligen Batterien an Motorgeneratoren (11) versorgen, die einem Versorgungsnetz über ein elektrisches Umspannwerk (14) elektrische Energie liefern.

3. Anlage für die Durchführung eines Verfahrens für die Energieerzeugung aus gebrauchtem Schmieröl nach Anspruch 2, **dadurch gekennzeichnet, dass** die Lageranlage für das Öl (9) einen Hilfsbehälter (10) aufweist, mit einer geeigneten Kapazität, um die Motorgeneratoren (13) zu versorgen, wenn kein mittels des Verfahrens gewonnener Nutzbrennstoff verfügbar ist.

Revendications

1. Processus pour génération d'énergie électrique à partir d'huiles lubrifiantes usées, **caractérisé essentiellement par le fait qu'il** comporte les phases de fonctionnement suivantes :
- Réception, déchargement, vérification et acceptation ou rejet des huiles en fonction de leur qualité.
 - Pompage de l'huile acceptée vers une usine de traitement où l'on procède au raffinage des huiles, par n'importe quel procédé qui, par craquage, produira un combustible léger susceptible d'être utilisé sur des moteurs rapides à combustion diesel.
 - Pompage de l'huile raffinée vers un parc de stockage d'où elle est finalement utilisée comme combustible léger pour l'alimentation de moto générateurs producteurs d'énergie électrique.
2. Installation pour la mise en pratique du processus pour génération d'énergie à partir d'huiles lubrifiantes usées de la première revendication, **caractérisée par le fait que** s'y trouve un quai de déchargement (1) pour les citernes (2) transporteuses ou re-collecteuses des huiles, avec lesquelles collabore

une unité de pompage (3) qui impulse l'huile vers un réservoir de réception (4), installé avant une série de réservoirs (5) pour l'huile sale acceptée, installés dans un parc de stockage (9) dans lequel on installe également les réservoirs (8) de stockage du produit raffiné, reliés à une usine (6) de traitement ou de raffinage de l'huile. par craquage, qui reçoit l'huile sale des réservoirs (5) et l'envoi aux réservoirs de stockage (8), avec lesquels collaborent une série de réservoirs mères (12) installés à la centrale (11) de génération électrique, chargés d'alimenter des batteries respectives de moto générateurs (13) qui fournissent de l'énergie électrique au réseau de distribution par un centre de transformation électrique (14).

3. Installation pour la mise en pratique du processus pour génération d'énergie à partir d'huiles lubrifiantes usées, d'après la 2^{ème} revendication, **caractérisée par le fait que** le parc de stockage d'huile (9) comporte un réservoir auxiliaire (10) de capacité adéquate pour pouvoir alimenter les moto générateurs (13) en l'absence de combustible utile obtenu par le processus.

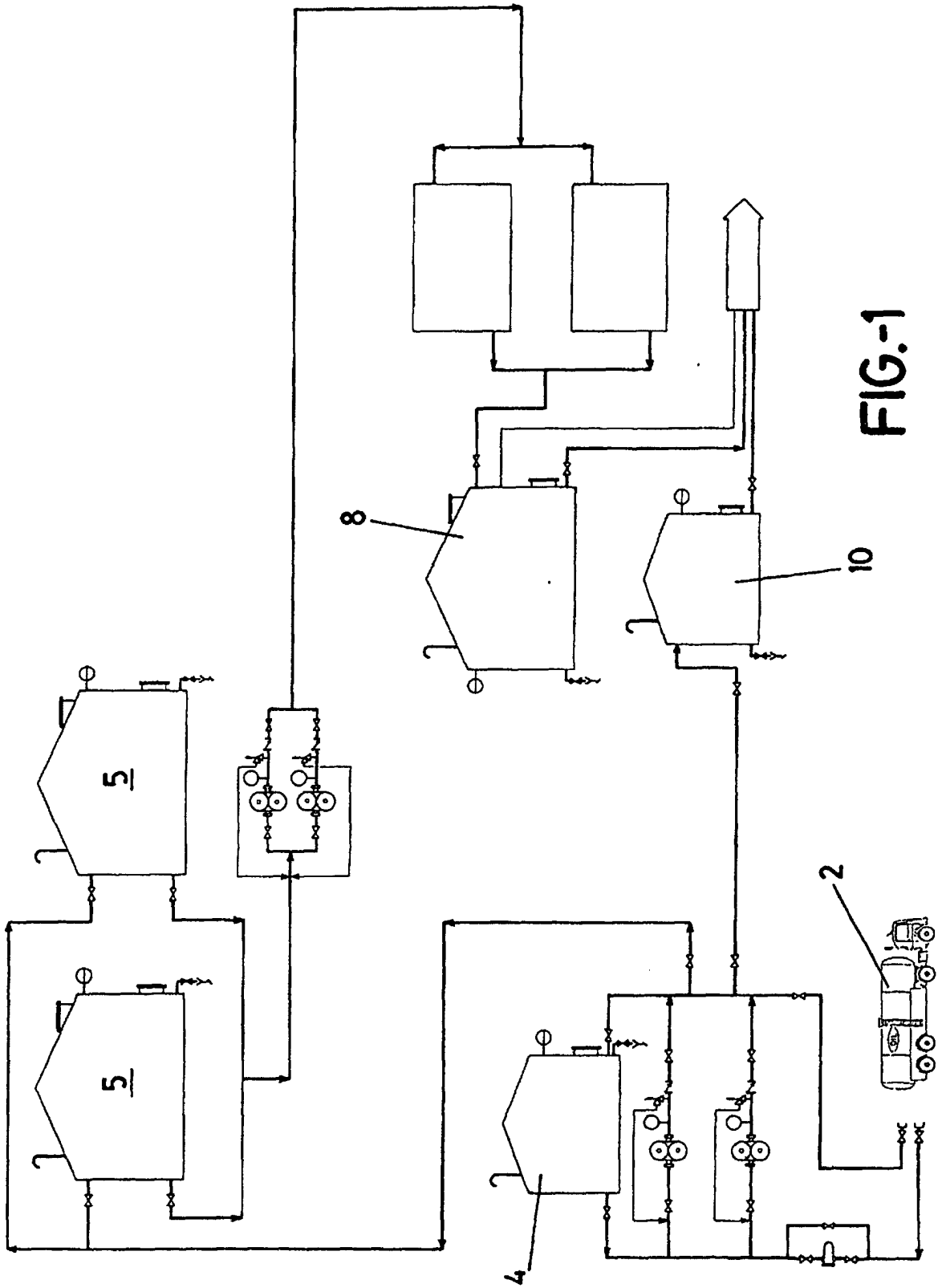
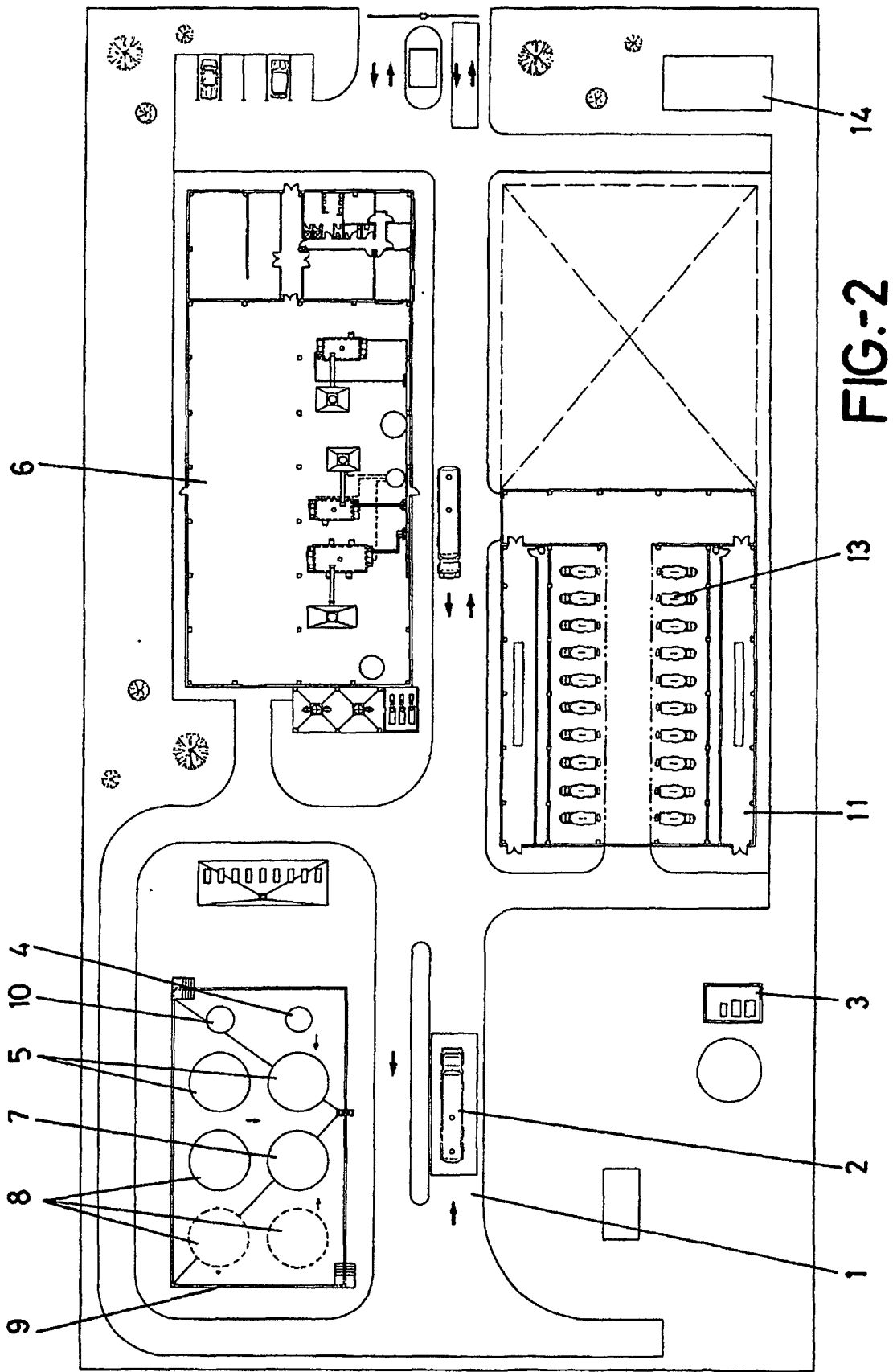


FIG.-1



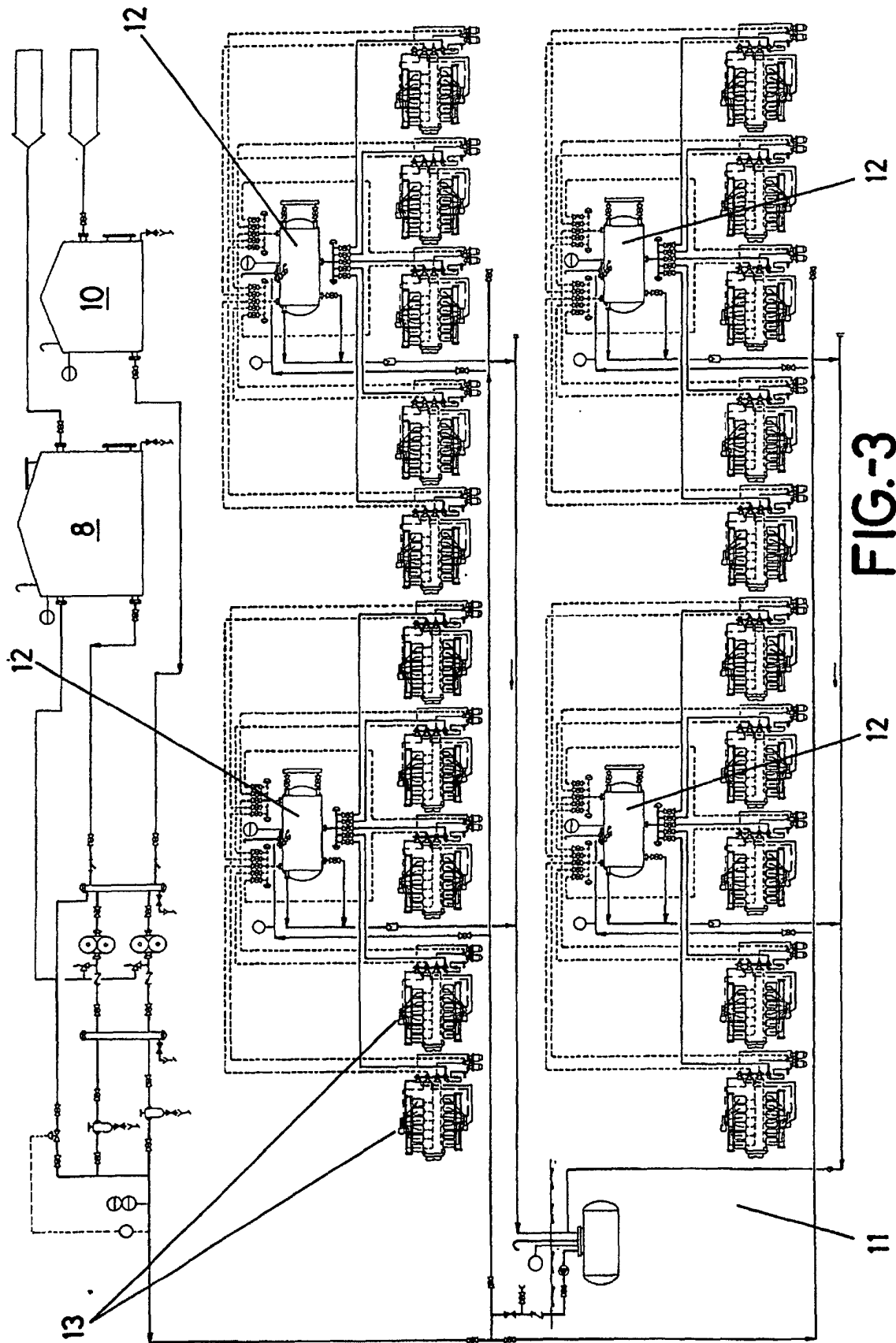


FIG.-3