

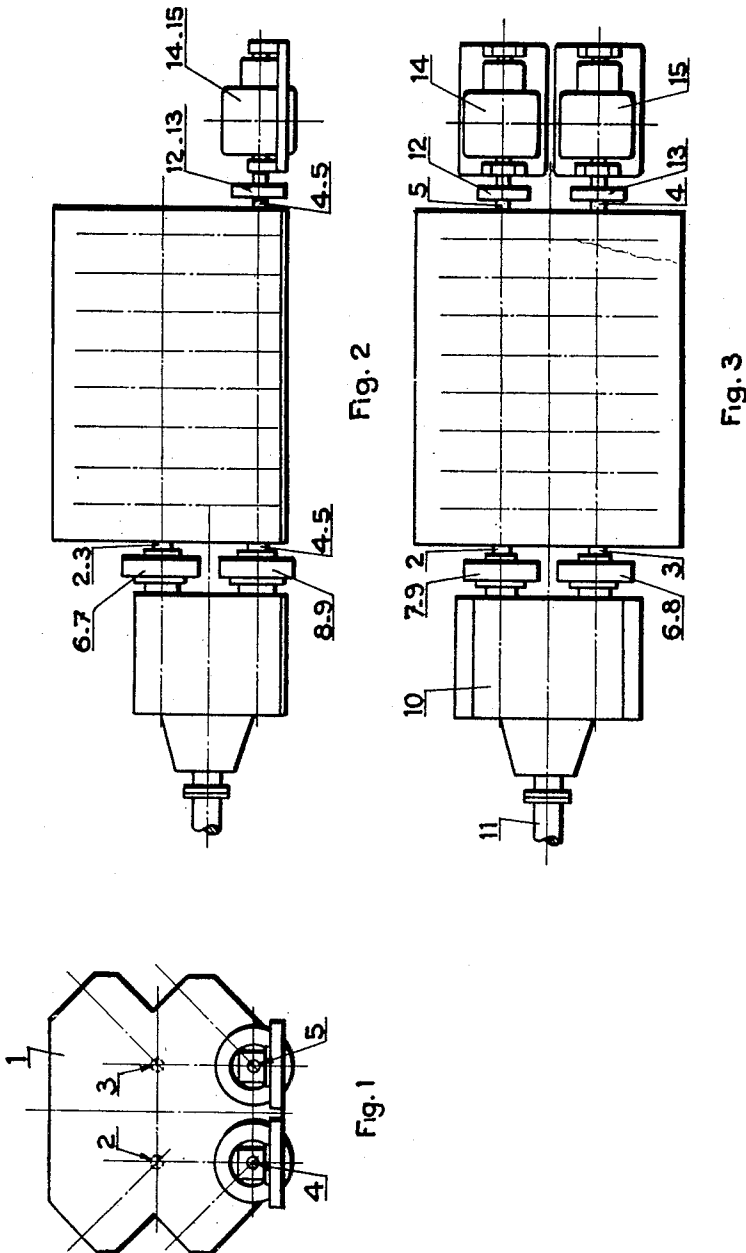
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MULTIPLE POWER PLANT, INCLUDING AN ELECTRIC GENERATOR

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MULTIPLE POWER PLANT, INCLUDING AN ELECTRIC GENERATOR

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This invention relates to multiple power plants of the type comprising a number of engines, such as diesel engines or the like, at least one of which is releasably coupled with an electric generator. Power plants of this general type are commonly used for ship-propulsion.

The requirements in electric power on board ship are particularly high during the periods when the ship is in port, because of the necessity of operating handling and hoisting apparatus and the like at such times. In the past auxiliary electric power-plants were generally provided for this purpose on board ship; this however was unsatisfactory from an economical standpoint, both because of the high expense involved in building and installing such an auxiliary plant, and because of the comparatively short periods during which such a plant is operated under full load capacity, viz. while the ship is in harbour.

Accordingly, in more recent years, a ship power-plant system has been suggested which comprises a number of similar engines, for instance three identical diesel engines, the drive torque from which is transmitted to the ship's screw through a reducer gearing; while two of said engines are arranged to actuate the common reducer gear through respective pinions, with a clutch interposed between each said engine and the reducer, the remaining engine is coupled with an electric generator and is further coupled, coaxially with its shaft, through a pinion with the afore-mentioned reducer, clutch means being further provided for selectively coupling said third engine with the generator or with the reducer. Such an arrangement, while providing definite advantages over the older procedure involving the provision of a separate auxiliary electric plant, is not wholly satisfactory, especially because of the high longitudinal space requirements of such an installation, and also because it lacks flexibility in use.

It is the general object of this invention to provide an improved ship's power plant of the type described in the foregoing paragraph which is less space-consuming, more flexible and versatile in use, and generally more advantageous than previous plants of similar type.

With the above and further objects in view, I provide an engine group having a plurality of independently driven crankshafts, such as a multi-crankshaft diesel engine of the general type described for instance in my copending application Serial No. 135,561, a reducer gearing driven from one end of all of said crankshafts

and driving a propeller shaft, an electric generator driven from at least one of said crankshafts at the end thereof opposite from said reducer, and clutch means between said crankshafts and said reducer and between said crankshafts and said generator.

Preferably, at least two generators are provided, one for each of two of the crankshafts of the multi-crankshaft engine, one of said generators serving for stand-by or reserve purposes.

Among the advantages of the power-plant of the invention, in addition to reduced space requirement, the following may be mentioned: Each generator may be used as an electric motor which may be fed with current from other generating means during normal cruising of the ship. The additional power thus obtained is then directly transmitted to the ship's screw, and is used for propelling the ship. Moreover, the generators may be used as braking means when required to stop the ship on short notice. During maneuvering operations a generator may serve as a source of current usable for quickly starting one or more of the engines. Once the engines thus started, current may continue to be supplied to them, so that the power available for motion ahead and astern may be substantially the same. The compressed air starting means conventionally used for starting the engines may be dispensed with, provided a suitable auxiliary source of current is available for the initial starting of a generator. Where, as in the preferred embodiment of the invention, the engine group is used is a multi-crankshaft engine of the type specified above, a generator may be mounted on each of the crankshafts, or on each of the lower crankshafts only. Thus, a power-plant may be constructed including four crankshafts and two generators for example. Assuming the two upper engine units of the group are V-type engine units, the power available on each of the lowermost, crankshafts with which the generators are coupled will then be one sixth of the total power output. It is found that such a ratio for the power output of the generator relatively to the total engine power output is particularly well suited for the practical requirements in electric current when the ship is in port. This last-mentioned arrangement further has another advantage, namely the starting torque available will then be from about $\frac{1}{4}$ to $\frac{1}{2}$ of the normal engine torque, so that the electrical starting operation is considerably facilitated.

A specific embodiment of the invention will

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now be described for purposes of illustration and not of limitation, with reference to the accompanying diagrammatic drawings, in which:

Fig. 1 is an end view of a power plant according to the invention comprising a multi-crankshaft engine group with four crankshafts where- 5 in the upper engine units are of the V-type;

Fig. 2 is a side view thereof;

Fig. 3 is an overhead view thereof.

As shown in the drawings, the multi-crankshaft engine group 1 has four crankshafts 2, 3, 4 and 5. The upper crankshafts 2 and 3 being operated by rows of cylinders set in V arrangement. Each crankshaft is coupled through clutches 6, 7, 8 and 9 respectively with a speed reducer gear 10 driving the propeller shaft 11. Each of the two lowermost crankshafts 4 and 5 is provided, at the end thereof opposite from that at which the reducer is arranged, with respective clutches 12 and 13 of any suitable form through which they are coupled with re- 20 spective electric generators 14 and 15 operable independently from each other.

It will be seen that when it may be required to produce electric power at a high load as when the ship is in harbour, for cargo handling and similar purposes for example, one or both of the clutches 8 and 9 may be disengaged, and the corresponding one or ones of the clutches 12, 13, engaged, whereupon one or both of the gen- 30 erators 14, 15 will be set into action.

As stated hereinabove in the preamble to this specification, in the particular embodiment shown the power capacity of each of the gen- 35 erators 14, 15 is preferably about $\frac{1}{6}$ the total power output of the engine group.

It will be understood that while the invention has been described and illustrated more specifically as embodied in a power-plant comprising an internal combustion or Diesel engine group of the multi-crankshaft type specified, this while constituting a preferred embodiment, is by no means essential, and other types of engine groups having a plurality of output shafts may be used. It should also be understood that the invention is not restricted to use in power-plants for ships, and is applicable to other vehicles and also to stationary power-plants.

What I claim is:

1. In a power plant principally adapted for use for the propulsion of ships and like purposes, the provision of at least two independent piston-

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and-cylinder units, of a crankshaft related to each one of said units, of a main power-shaft, of common transmission means inserted between said crankshaft and power shaft, at least one electric generator driven by one of said units, said generator being located in alignment with the crankshaft on the end of said unit opposite the end corresponding to said transmission means, and independent disengageable coupling means on both ends of said unit connecting it on the one hand with the generator and on the other hand with said common transmission means.

2. A power plant according to claim 1 wherein each one of said piston-and-cylinder units is provided with a corresponding electric generator.

3. In a power plant according to claim 1 the provision of superposed sets of piston-and-cylinder units, the lowermost units being each provided with the aforesaid generator.

4. A power plant according to claim 1 comprising means for the supply of current to said generator acting as a motor and connecting means from said motor to each of said units for starting any one of them.

5. A power plant according to claim 3 comprising in addition to said lowermost units two uppermost units consisting of a double row of cylinders in V formation, a generator coupled to each one of said lowermost units, the power capacity of each said generator being substantially one sixth of the total capacity of the plant.

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