

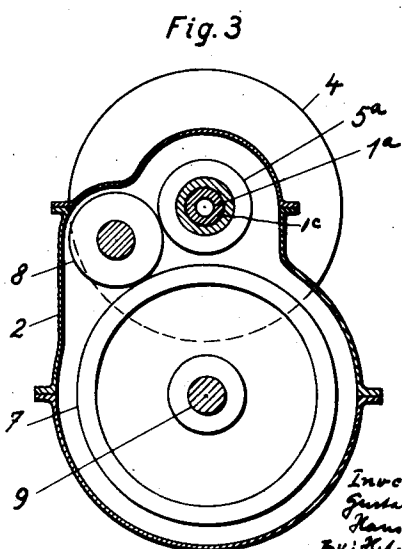
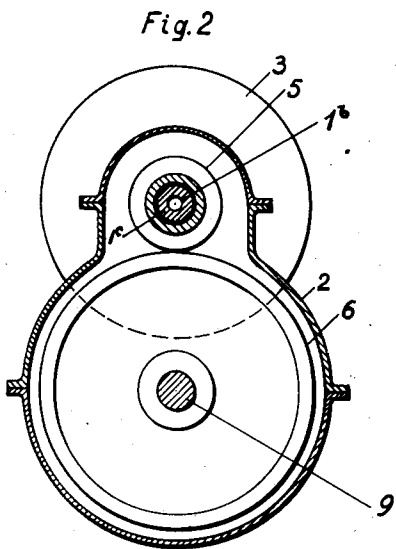
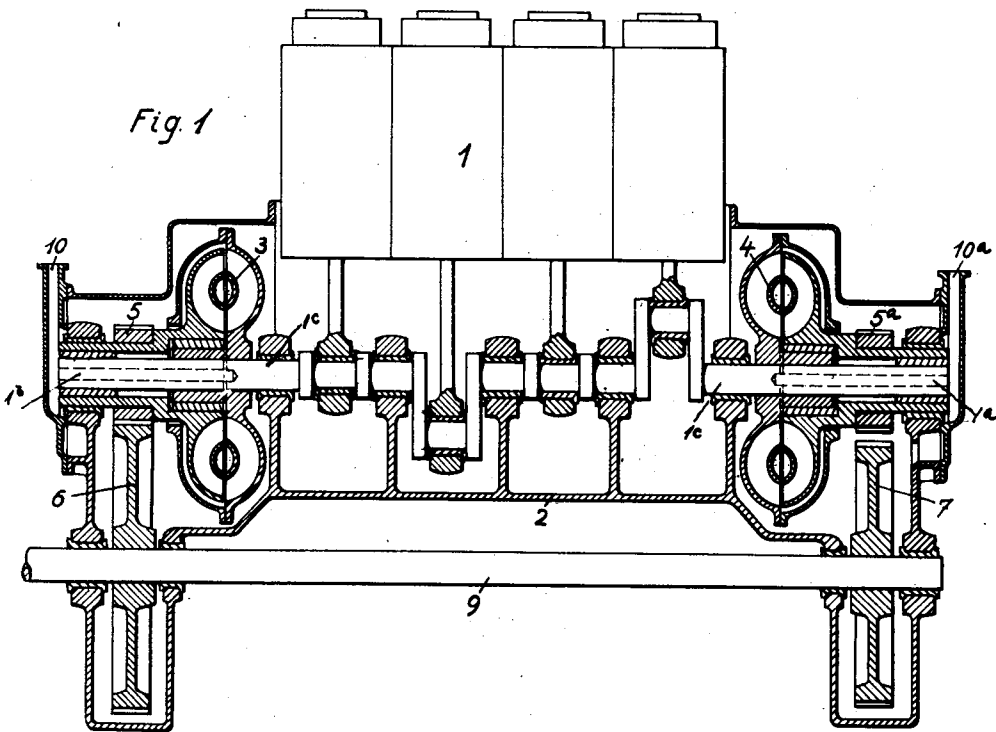
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G. BAUER ET AL
SHIP PROPELLING PLANT

Filed Sept. 2, 1924

2 Sheets-Sheet 1



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Fig. 4

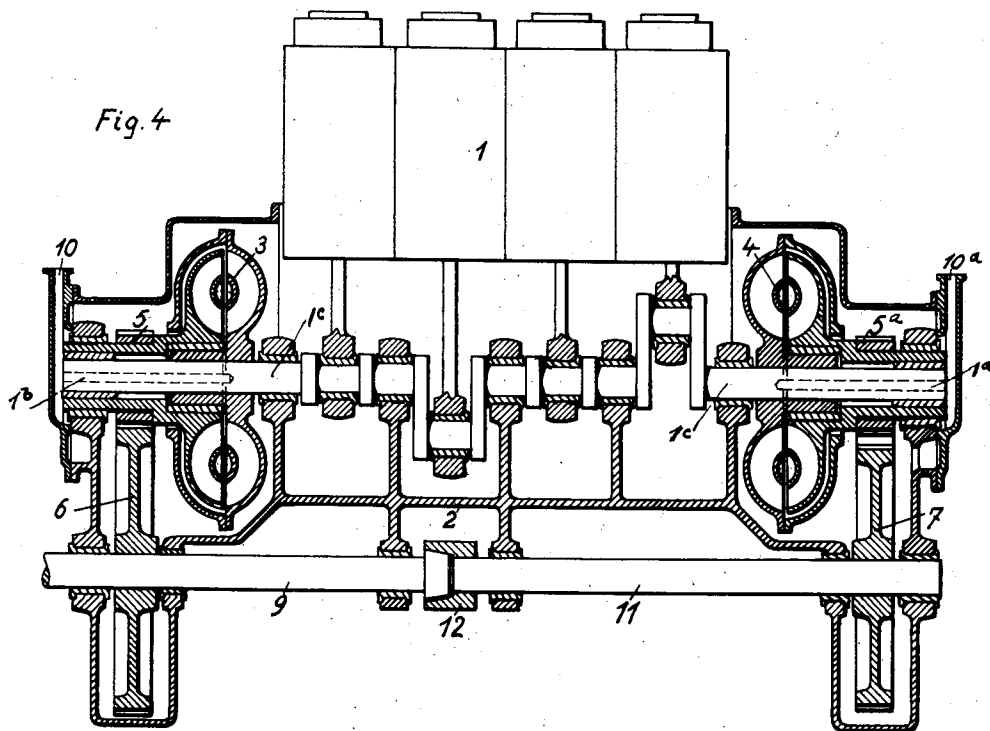
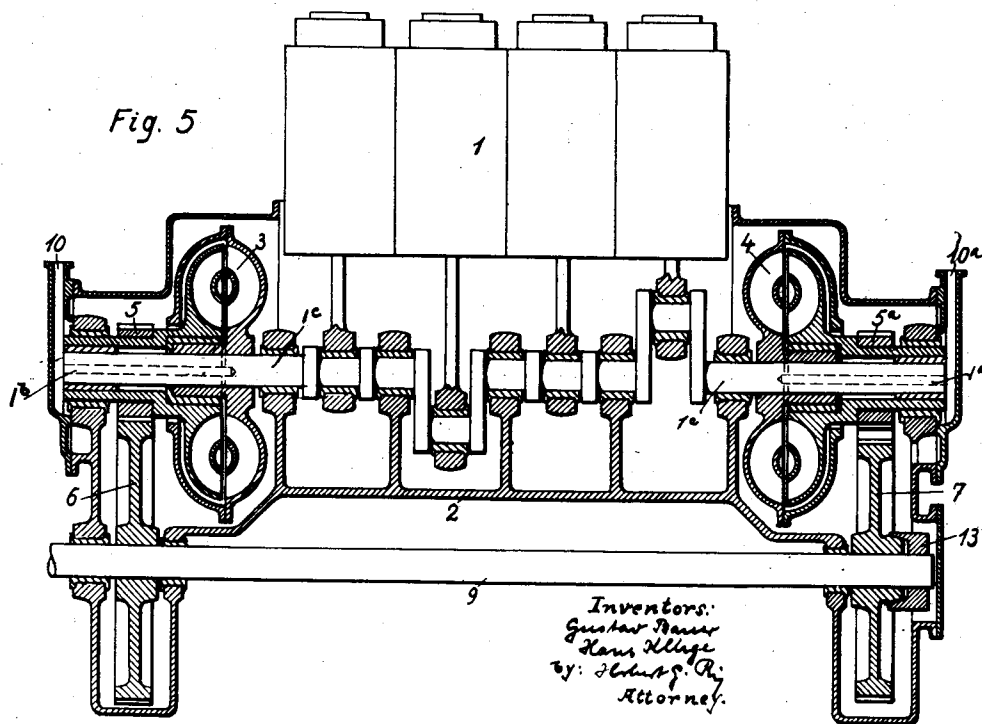


Fig. 5



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UNITED STATES PATENT OFFICE.

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SHIP-PROPELLING PLANT.

Application filed September 2, 1924, Serial No. 735,446, and in Germany October 17, 1923.

Our invention relates chiefly to ship propelling plants of the kind, in which the propeller is driven by an oil-engine by the intermediary of a hydraulic gearing and a cog-wheel gearing. More especially, the invention relates to such propelling plants in which the cycles or circuits for running ahead or astern of the hydraulic gearing are arranged at one end of the oil-engine and the propeller is driven by one cog-wheel gearing.

The present invention relates to an improved arrangement and combination of the before-mentioned members of the ship propelling plant, in that a hydraulic gearing and a cog-wheel is provided at either end of the oil-engine, each hydraulic gearing comprising one cycle or circuit. This arrangement renders it possible to supply the service-liquid to the two cycles or circuits through the hollow shaft; besides, the cycles or circuits, of which one serves for running ahead the other for running astern, can be completely like one another which is advantageous for devising and manufacturing the plant. Both hydraulic gearings can be devised to act as hydraulic coupling operating with high efficiency. In order to render possible the reversal of the direction of rotation of the propeller shaft, a separate cog-wheel is inserted into the cog-wheel gearing intended for running astern, that separate wheel being inserted between the large cog-wheel and the pinion of that gearing.

Our invention is illustrated diagrammatically and by way of example in the accompanying drawings in which Figure 1 partly is a side-view and partly an axial section, of the complete propelling plant, Figure 2 is a vertical section through the cog-wheel gearing located at the lefthand end of Fig. 1, and Figure 3 is a vertical section through the cog-wheel gearing located at the righthand end of Fig. 1, both sections lying at right angles to the section in the lower half of Fig. 1; and Figures 4 and 5 are two views similar to Fig. 1 and showing two modifications.

Referring to Figure 1, 1 denotes the oil-engine, 2 the foundation-plate thereof, 3 the hydraulic gearing for running ahead, 4 the

hydraulic gearing for running astern; 5 (and 5^a) denote the two pinions of the two cog-wheel gearings; 6 and 7 denote the large cog-wheels thereof, the wheel 6 meshing directly with the appertaining pinion 5, but the wheel 7 meshing with another pinion 8, Fig. 3, which meshes with the appertaining pinion 5^a. 9 is the propeller-shaft, and 10, 10^a are two supply-passages for the service-liquid. In Figure 4 the propeller-shaft consists of two parts 9 and 11 which are connected with each other by a clutch 12, and in Figure 5 a clutch 13 is provided at the free end of the shaft 9, the hub of the adjacent large cog-wheel 7 forming the part of this clutch.

The operation of the propelling plant illustrated in Figs. 1-3 is as follows:

While running ahead the oil-engine turns the pinion 5 by the intermediary of the hydraulic gearing 3 whereby also the large-cog-wheel 6 and the shaft 9 are rotated in proper direction, viz, for running ahead. If instead of the two hydraulic gearings shown in Fig. 1 (also in Figs. 4 and 5) only one such gearing would be provided at the front end of the engine (righthand end of Fig. 1), then this one gearing must have reversing nozzles and the pinion of the appertaining cog-wheel gearing must mesh directly with the appertaining large cog-wheel, as in Fig. 2 (this figure relating, however, in fact, to the rear end of the plant), the running astern being then effected by reversing the nozzles. Now, in the present improved construction, the pinion 5^a and the cog-wheel 7 at the front end of the plant do not mesh directly, but an intermediate pinion or cog-wheel 8 (Fig. 3) is inserted between said two wheels whereby it is rendered possible to dispense with reversing nozzles, the propeller shaft rotating in the opposite direction, i. e. for running astern, when the service-liquid is supplied to the hydraulic gearing in question through the pipe 10^a and the passage 1^a provided at the front end of the crank-shaft 1^c. At the other end of this shaft is a passage 1^b to which the service-liquid is supplied through the pipe 10. The hydraulic gearings 3 and 4 are perfectly alike. In the plant shown in Fig. 1, the front

gearings 4 and 5^a—8—7 rotate also while the gearings 3 and 5—6 are in operation the vessel running then ahead, and the hydraulic gearing 4 being then empty. This useless rotation of the gearings 4 and 5^a—8—7 gives rises to losses caused by friction, as well as by eddies arising in the gearing 4, the losses in this gearing being under circumstances somewhat great because the primary part and the secondary part of this gearing rotate in opposite directions.

In order to obviate such losses, especially on a somewhat long voyage, and engaging and disengaging coupling or clutch can be provided, permitting to throw out of gear the gearings 4 and 5^a—8—7 when the vessel is running ahead.

In Figure 4 the propeller shaft is divided into two parts 9 and 11 which are connected with each other by a friction clutch 12 that may be operated mechanically or electrically or hydraulically, as desired or preferred. I have abstained from showing and describing also an example of any one of these coupling-operating means as neither thereof forms a part of the present invention. In Figure 5 a friction-coupling 13 is provided at the free end of the shaft 9, the member 13 being the matrix-part of the coupling, the matrix-part being formed by the suitably shaped hub of the cog-wheel 7. Moving the movable member of one or the other coupling or of any other coupling employed instead of the coupling 12 or 13 can be effected simultaneously with supplying the service-liquid to the hydraulic gearing 3 or with discharging it from the hydraulic coupling 4, and a blocking device may be provided to actuate the respective coupling automatically whenever one or the other hydraulic gearing is supplied with the service-liquid or emptied, as the case may be.

Thus, in the case of a long running ahead, the gearings 4 and 5^a—8—7 can be thrown out of gear, the propeller-shaft being driven by the gears 3 and 5—6 and the losses otherwise caused by the other gears being reduced to a minimum practically to be neglected. Only when the vessel approaches a harbor or when manœuvring becomes necessary, also the other gearings are thrown into gear and manœuvring and reversing can then take place in the usual manner.

Although we have described the invention in detail merely with respect to a ship, we wish it to be understood that it can be employed advantageously also in connection with vehicles, such as locomotives, railway motor-cars, freight motor-cars, passenger motor-cars, and the like.

We claim:

1. A power-generating plant for motor-driven vessels and cars, comprising, in combination, an oil-engine, a hydraulic gearing at one end of the crank-shaft of said engine,

and a hydraulic gearing at the other end thereof; a cog-wheel gearing connected with the driven part of the first-mentioned hydraulic gearing and a cog-wheel gearing connected with the driven part of the other hydraulic gearing; a propeller shaft adapted to be driven by said hydraulic gearings and said cog-wheel gearings; and means for disconnecting one of the cog-wheel gearings from the driven part of the last-mentioned shaft, substantially as set forth.

2. A power-generating plant for motor-driven vessels and cars, comprising, in combination, an oil-engine, a hydraulic gearing at one end of the crank-shaft of said engine, and a similarly devised hydraulic gearing at the other end thereof; a cog-wheel gearing connected with the driven part of the first-mentioned hydraulic gearing and comprising a pinion forming the member which is connected with the appertaining hydraulic gearing, and a larger cog-wheel meshing with said pinion and being secured to the shaft to be driven by this gearing; and another cog-wheel gearing connected with said other hydraulic gearing and comprising a pinion forming the member which is connected with the appertaining hydraulic gearing, a larger cog-wheel which is carried by the shaft to be driven, and another pinion meshing with the first-mentioned pinion of this gearing and the appertaining larger cog-wheel, and means for connecting the last-mentioned larger cog-wheel with the shaft to be driven and for disconnecting it therefrom, substantially as described.

3. A power-generating plant for motor-driven vessels and cars, comprising, in combination, an oil-engine, a hydraulic gearing at one end of the crank-shaft of said engine, and a hydraulic gearing at the other end thereof; a cog-wheel gearing connected with the driven part of the first-mentioned hydraulic gearing, and a cog-wheel gearing connected with the driven part of the other hydraulic gearing; and an engaging and disengaging coupling for connecting one of the cog-wheel gearings with the shaft to be driven and for disconnecting it therefrom, substantially as set forth.

4. A power-generating plant for motor-driven vessels and cars, comprising, in combination, an oil-engine, a hydraulic gearing at one end of the crank-shaft of said engine, and a similarly devised hydraulic gearing at the other end thereof; a cog-wheel gearing connected with the driven part of the first-mentioned hydraulic gearing and comprising a pinion forming the member which is connected with the appertaining hydraulic gearing, and a larger cog-wheel meshing with said pinion and being secured to the shaft to be driven by this gearing; and another cog-wheel gearing connected with said other hydraulic gearing and comprising a

pinion forming the member which is connected directly with the appertaining hydraulic gearing, a larger cog-wheel which is carried by the shaft to be driven, and another pinion meshing with the first-mentioned pinion of this gearing and the appertaining larger cog-wheel, and a friction coupling for connecting this cog-wheel with the shaft to be driven and for disconnecting it therefrom, substantially as described. 10

In testimony whereof we affix our signatures.

DR. GUSTAV BAUER.
HANS KLUGE.