June 23, 1936. S. S. COOK 2,045,322

COMBINED RECIPROCATING AND TURBINE ENGINE INSTALLATION

Filed April 7, 1934 2 Sheets-Sheet 1

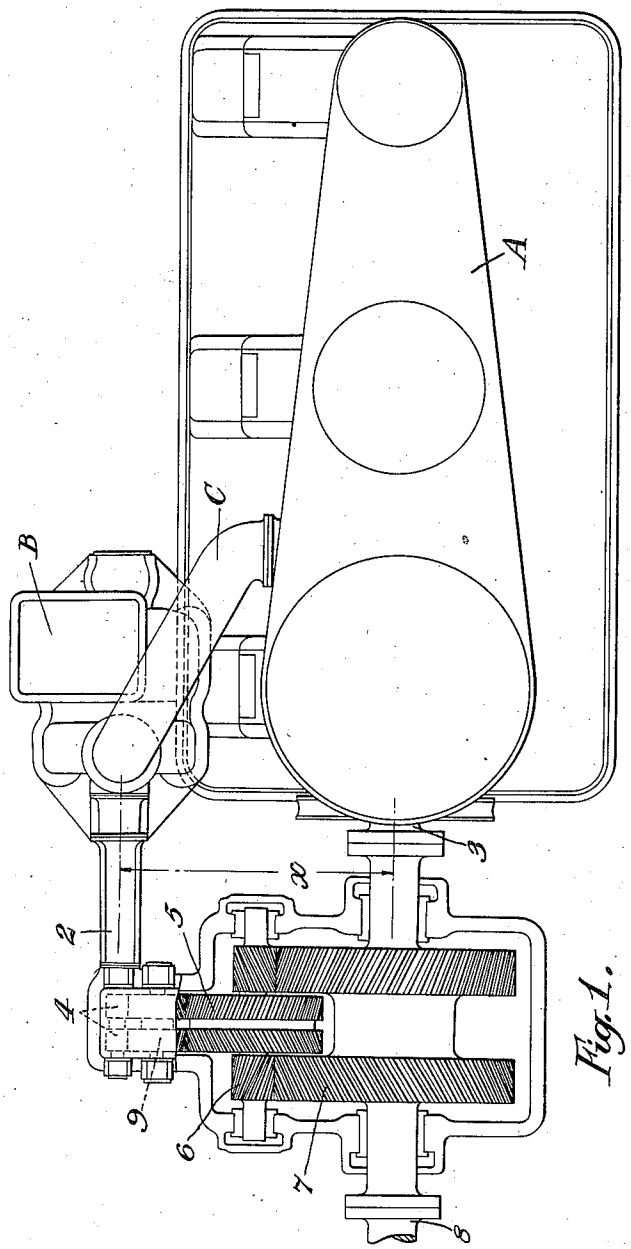


Fig. 1.

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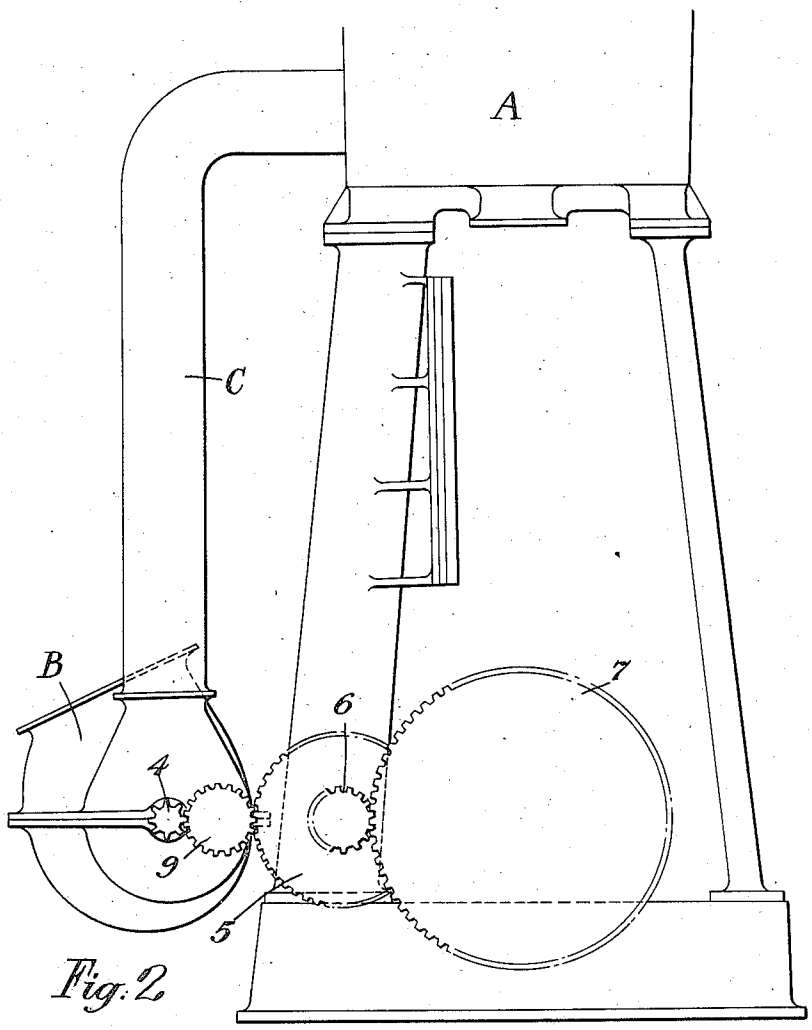


Fig. 2.

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Patented June 23, 1936 2,045,322

UNITED STATES PATENT OFFICE

2,045,322

COMBINED RECIPROCATING AND TURBINE ENGINE INSTALLATION

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Application April 7, 1934, Serial No. 719,487
In Great Britain April 11, 1933

1 Claim. (Cl. 60—21)

This invention relates to elastic-fluid installations comprising a reciprocating engine (hereinafter called a "reciprocator") and a turbine geared together and more particularly, though not exclusively, to such installations embodying a steam reciprocator and an exhaust-steam turbine operating in conjunction therewith.

In marine reciprocator-turbine installations comprising a direct-coupled reciprocator and a turbine geared together and employing propeller propulsion, the size of the gear wheel on the propeller shaft is limited by the height of the shaft above the tank tops and consequently, even when double-reduction gearing is employed, the distance between the axes of the propeller shaft and turbine in many cases cannot be made sufficiently great to enable the turbine to be disposed alongside the reciprocator and thus undesirable longitudinal space is required for the installation.

The main object of the present invention is to provide installation lay-outs wherein this difficulty is obviated.

With such an object, the present invention consists in a power-installation comprising an elastic-fluid turbine and a reciprocator arranged alongside of each other, the power shaft of the former being coupled to the power shaft of the latter by means of reducing gearing including an idler wheel.

Referring to the accompanying drawings, which are of a diagrammatic nature:—

Figure 1 shows a plan of a form of reciprocator-turbine installation according to the present invention,

Figure 2 being a corresponding end-view.

Corresponding parts in the different figures are denoted by the same reference symbols.

The difficulties above pointed out are overcome by virtue of the present invention, one form of which is shown in Figures 1 and 2.

In carrying out the invention according to this form, as applied to a marine steam reciprocator-turbine installation, the reciprocator, A, exhausts into the turbine, B, through the pipe, C, the reciprocator, A, and turbine, B, being arranged alongside one another, and the turbine shaft, 2, is connected with the power shaft of the reciprocator, B, by means of a train of gears preferably of double-helical type in order to afford axial balance, this train differing from the usual double-reduction gearing, inasmuch as the turbine pinion, 4, instead of gearing direct with the primary wheel, 5, engages with an idler wheel, 9, in turn engaging with the primary wheel, 5, which, as before, is rotationally rigid with the pinion, 6, engaging the gear wheel, 7, on the propeller shaft, 8. As usual in such constructions, the turbine shaft, 2, and the crankshaft, 3, are shown as geared together by double-reduction gearing comprising a pinion, 4, on the turbine shaft, gearing with the primary wheel, 5, on a lay-shaft carrying also the secondary pinion, 6, gearing with the secondary wheel, 7, on the propeller shaft, 8.

With this arrangement it will be appreciated that the necessary distance, x, between the axes of the reciprocating shaft and turbine shaft can be secured to enable the turbine, B, to be disposed alongside the reciprocator, A, as shown in Figure 1. In the embodiment illustrated in the drawings the axes of the turbine and propeller shafts, as well as those of the gears 6 and 9 occupy the same horizontal plane so that the idler gives an additional spacing between the propeller shaft axis and the turbine shaft axis equal to the pitch diameter of the idler. It will, of course, be appreciated that not all of these shafts may be level in a given installation and in this case the additional spacing afforded by the idler or its effective diameter for present purposes may be less than the full pitch diameter.

In addition, the length of the eduction pipe, C, is substantially reduced.

The idler-wheel drive is also useful when the power of an existing reciprocator is increased by the addition of a high-pressure turbine.

Variations may be made in detail from the constructional forms of the invention above described without exceeding the scope of the invention.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is:—

A power installation comprising an elastic-fluid reciprocating engine, a turbine receiving exhaust therefrom, said reciprocating engine and said turbine having power shafts arranged parallel to one another, a toothed wheel mounted on said reciprocating engine power shaft, a toothed pinion mounted on said turbine power shaft and intermediate shafts parallel to said power shafts carrying interengaging toothed-wheel units, one of said units being an idler wheel and the other comprising relatively large and relatively small coaxial toothed wheels, one of said units engaging with said toothed wheel on said reciprocating engine power shaft and the other of said units engaging with said

toothed pinion on said turbine power shaft, said turbine being arranged alongside said reciprocating engine with a clearance less than the effective diameter of said idler, said toothed wheels being of the double-helical type, said idler wheel engaging with said toothed pinion on said turbine power shaft, and the right- and left-hand parts of said toothed wheel on said reciprocating engine power shaft being spaced apart to engage with the correspondingly spaced-apart right- and left-hand parts of said relatively small toothed wheel, the right- and left-hand parts of said relatively large toothed wheel being axially juxtaposed and disposed intermediately of said spaced-apart toothed wheels.

STANLEY SMITH COOK.