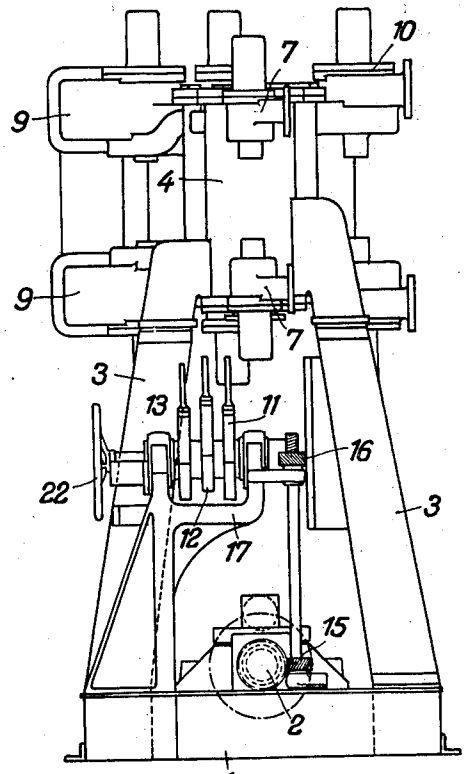
Oct. 23, 1934. A. SÜNDER 1,977,924

ECCENTRIC REVERSING DEVICE FOR MULTIPLE CYLINDER ENGINES

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Fig. 1



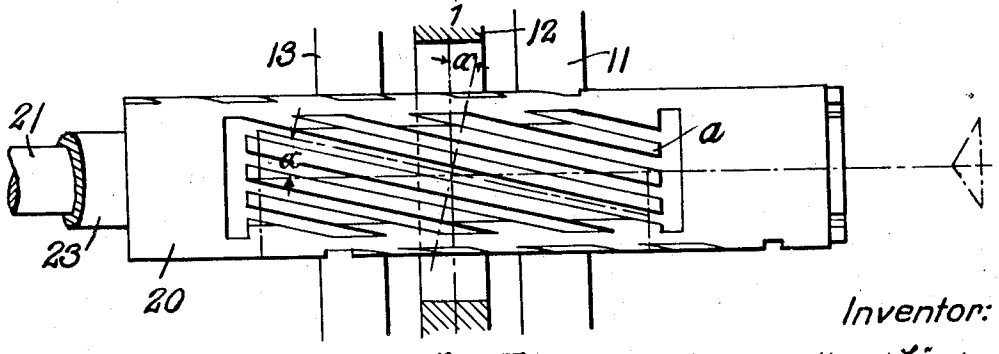


Fig. 2.

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ECCENTRIC REVERSING DEVICE FOR MULTIPLE CYLINDER ENGINES

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Fig. 2

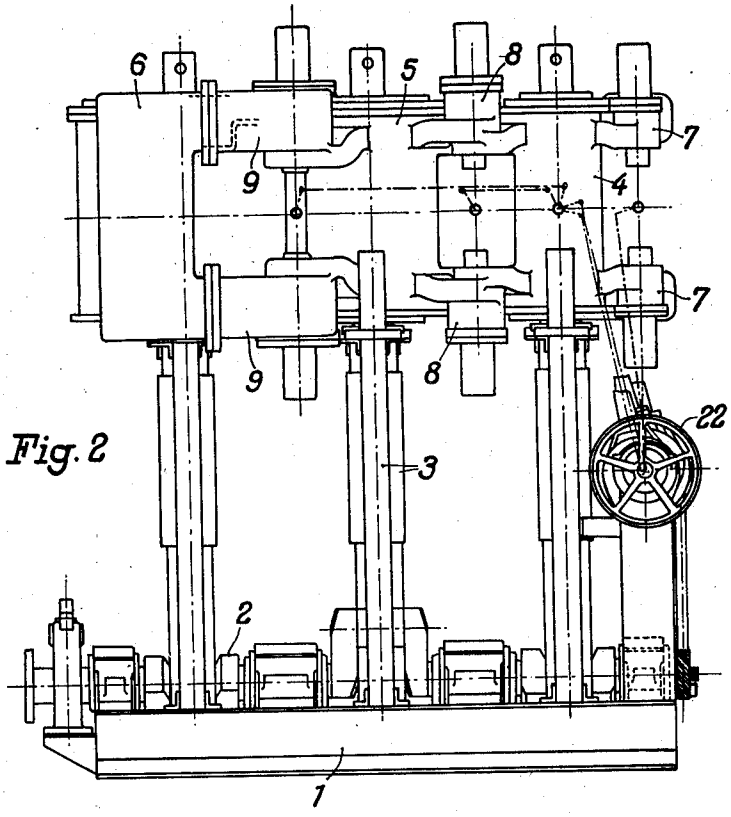
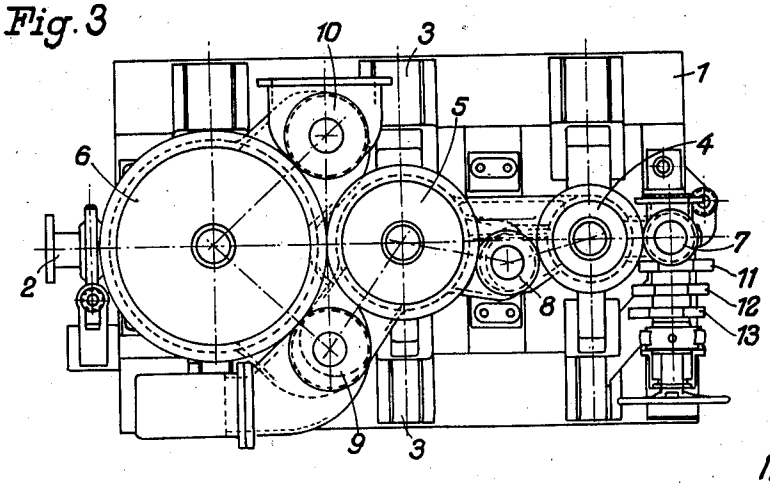


Fig. 3



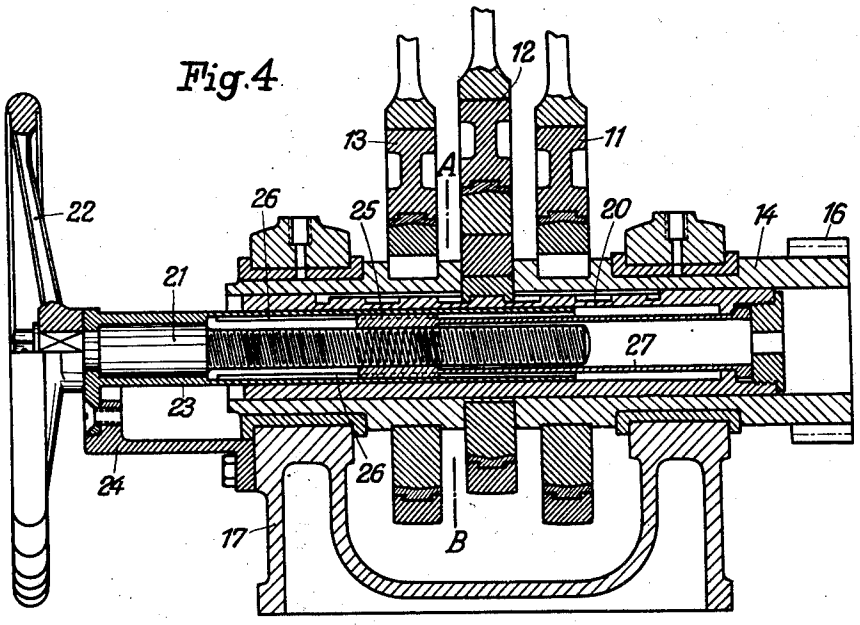
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ECCENTRIC REVERSING DEVICE FOR MULTIPLE CYLINDER ENGINES

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Fig. 4



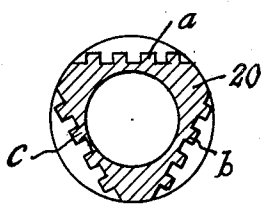


Fig. 6.

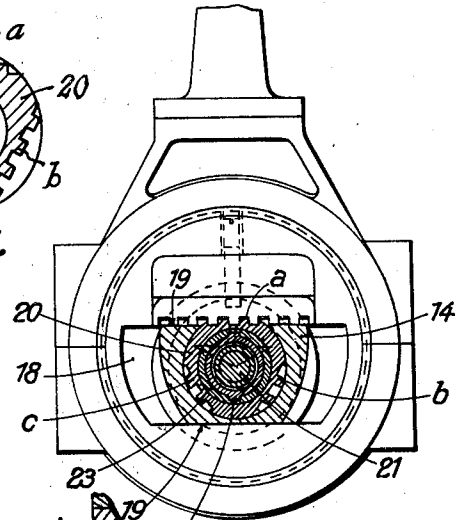


Fig. 5

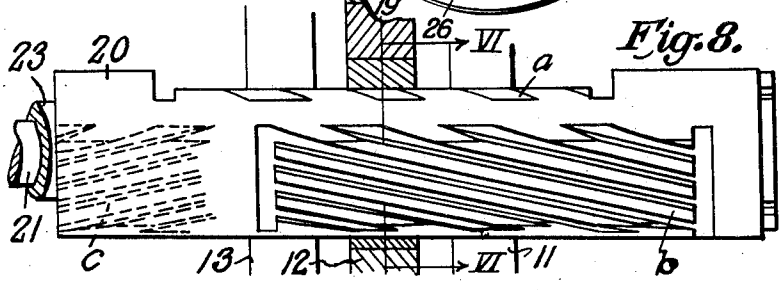


Fig. 8.

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Patented Oct. 23, 1934 1,977,924

UNITED STATES PATENT OFFICE

1,977,924

ECCENTRIC REVERSING DEVICE FOR MULTIPLE CYLINDER ENGINES

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Application June 3, 1931, Serial No. 541,846
In Germany June 7, 1930

2 Claims. (Cl. 121—111)

This invention relates to a special construction of reversing device for multiple cylinder steam engines for ships employing control cams. In this type of reversal the cams and parts of the reversing gear situated on the extension of the crank shaft were hitherto driven directly by the crank shaft or by an auxiliary shaft, arranged parallel thereto. This one type of drive is open to the serious objections, especially in the case of steam engines for ships, that the engine must be made considerably longer, owing to the adjusting device of the control, so that the rear wall of the boiler house, directly in front of the machine, must be extended further forward with the boilers arranged in front thereof, so that storage room is lost, whereas in the second type of drive the control mounted on the auxiliary shaft detrimentally affects the accessibility of the engine.

The present invention avoids this objection and enables also a reduction of the constructional length, owing to the fact that the entire reversing gear, including the adjusting device, is arranged perpendicular to the longitudinal central plane of the machine and mounted on a common control block. Thus, an extremely compact construction can be obtained in that all parts influencing the control cams are mounted one within the other with common axle, the reversal being possible without transmission by suitable arrangement of toothed wheels or levers with connecting rods.

An embodiment of the invention is illustrated by way of example in the accompanying drawings in which:—

Fig. 1 shows in side elevation a triple expansion ship's engine.

Fig. 2 is a front elevation of Fig. 1.

Fig. 3 is a top plan view of Fig. 1.

Fig. 4 shows on a larger scale a central section through the controlling mechanism and the control block.

Fig. 5 is a section on line V—V of Fig. 4.

Fig. 6 shows on a larger scale a cross section on line VI—VI of Fig. 8 of an adjusting sleeve.

Fig. 7 is a top plan view of Fig. 6.

Fig. 8 is a side elevation of the adjusting screw, the control cam being shown diagrammatically.

The ship's steam engine illustrated consists of a bedplate 1 with a crank shaft 2 mounted thereon and cylinders 4, 5, 6 arranged on columns 3. Housings 7, 8, 9, 10 for the controlling elements are arranged at the side of the cylinders. These elements are in the present instance assumed to be valves.

The control valves are actuated in known manner by toe cams not shown, which are driven by eccentrics through the intermediary of rocker levers and the like. In the present instance three eccentrics 11, 12 and 13 are employed for controlling the valves. These eccentrics are mounted on a common hollow shaft, which is driven by the crank shaft 2 in a suitable manner, for example by a pair of worm wheels 15, 16. The hollow shaft 14 is journaled in a control block 17 which, for example, is arranged at one end of the engine at the height of the hand. Each of the eccentrics is provided with a longitudinal slot 18, by means of which it is guided on parallel slide surfaces of the eccentric shaft 14. The guides of the three eccentrics are in each case mutually displaced 120°. By shifting the eccentrics on these guides 19, the eccentrics can be adjusted for different charges and for forward and reverse speeds.

A sliding sleeve 20 mounted on the hollow shaft 14 serves for the simultaneous adjustment of all the eccentrics, this sleeve carrying on its outer circumference three inclined toothed portions, *a*, *b*, *c*, mutually displaced by 120° as is more clearly shown in Figs. 6 to 8. The teeth are inclined at an angle α to the axial direction of the adjusting sleeve 20 and are mutually displaced in axial direction so that each of the coordinate eccentrics 11, 12, 13 in the zero portion lies in the middle of the teeth *a*, *b*, *c*, (see Fig. 7). The teeth of these toothed portions engage through apertures in the driving shaft 14 with corresponding inclined teeth on the eccentric discs. The sliding sleeve 20 rotates with the driving shaft 14.

During an axial displacement of the sleeve out of its central position to the right or to the left all eccentrics are at the same time shifted in their guides 19 out of the zero position to the right or to the left and thus adjusted for different changes either for the forward or backward running of the engine. The amount of the adjustment is indicated by the triangles shown in dotted lines in Fig. 7.

The shifting of the sleeve 20 is effected by a screw spindle 21 with a hand wheel 22. The screw spindle 21 is rotatably mounted in a sleeve 23, the sleeve 23 being carried by a bracket 24 fixed on the control block 17. A travelling nut 25 is shiftably arranged on the spindle 21 in the sleeve 23 and secured against rotation by a nut guide 26. The nut extends into a sleeve 27 rotatably connected at its end with the sliding sleeve 20 by means of a flange and nut.

By turning the spindle 21 the travelling nut 25 is shifted towards the one side or the other

out of its central position, in which the eccentrics are set for "no charge", so that the engine operates in one or other direction with corresponding charge.

As can be seen, all the elements influencing the control eccentrics are arranged in the construction of the control mechanism in a common axis, which lies perpendicular to the central plane of the engine, so that in this arrangement no edging forces can occur during adjustment, being prevented without transmission by a suitable arrangement of toothed wheels or levers with connecting rods, and the entire arrangement can be accommodated in a very narrow control block. The control block may be arranged either on the front or on the rear end of the engine or between the cylinders. In all these instances, owing to the compact construction, the constructional length of the engine can be reduced relative to the known constructions, this being of importance when employing the engine for ship driving, because all space saved becomes free for cargo.

I claim:

1. An eccentric reversing device for multiple cylinder ship's steam engines, comprising in combination with the crank shaft, a control block arranged at right angles to said crank shaft and including a hollow driving shaft, control eccentrics on said shaft, a sleeve within said shaft, adapted to adjust said eccentrics, and an adjusting spindle in said sleeve adapted to adjust said sleeve.

2. An eccentric reversing device for multiple cylinder ship's steam engines, comprising in combination with the crank shaft, a control block arranged at right angles to said shaft, an adjusting sleeve in said block, a screw spindle in said sleeve and a sliding nut rotatably connecting said spindle to said sleeve, and means for locking said nut against rotation.

AUGUST SÜNDER.