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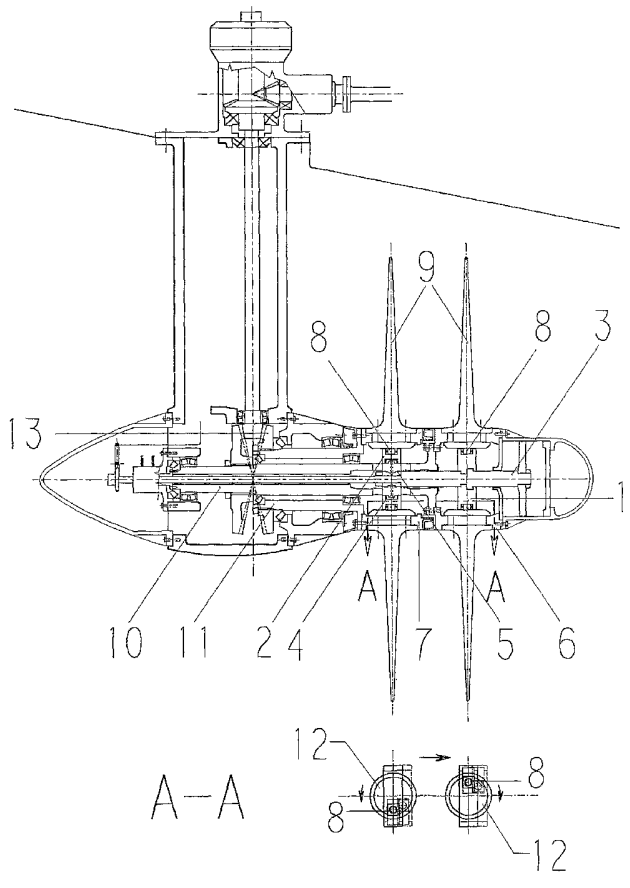
(54) Title: CONTRA ROTATING VARIABLE PITCH PROPELLERS



(57) Abstract: The invention is featuring simple technical solution for blades pitch control of two marine propellers put in contrarotating relation. The arrangement comprises two hollow concentric shafts driven in opposite direction of rotation by means of set of bevel gears (13), "inner" one (10) embodying pitch control rod (3), flanged to propeller hub (6) and outer shaft (11) flanged to hub (7). Jokes (1) and (2) are fitted to pitch control rod (3), thereof joke (1) rotates with hub (6) and joke (2), thanking to axial bearings (4), rotates freely in opposite direction. Translation of pitch control rod (3) in one direction actuates blade flanges (12) via blade crank pins (8) to rotate in opposite directions. Pitch control rod, actuated by hydraulic oil pressure on piston (14) with hydraulic oil distribution box and feed back device are integrated into systems as usual for CPP propellers. The invention combines high efficiency of contra rotating propellers with well known advantages of variable pitch propeller such as soft thrust reversing with non-reversible engines, reliable engine load control and overload protection, possibility of maintaining constant RPM for an PTO generator drive, and cleaner environment.

CONTRA ROTATING VARIABLE PITCH PROPELLERS

TECHNICAL FIELD

The Invention deals with marine propellers, in particular with contra rotating propellers featuring pitch control possibility.

BACKGROUND ART

It is well known that propulsive efficiency of contra-rotating propellers exceeds those of two separated propellers at the same conditions and also considerably exceeds efficiency of single propeller. However, majority of know contra-rotating arrangements is based on set of bevel gears engaged with two concentric shafts.

When reversing the direction of rotation theese gears suffer due to considerable inertial forces caused by retardation and acceleration of the system during manoeuvring.

In fact, it is only reversible two stroke diesel engine or reversible electric motor that can be coupled to contrarotating propellers system as described above.

According to available statistics, portion of four stroke installations sold on the market tends to increase while number of two stroke installations shows decreasing tendency.

The proposed invention is supposed to be viable solution for application of medium speed four stroke engines for high efficiency propellers in contra rotating arrangement.

DISCLOSURE OF THE INVENTION

The invention combines advantages of variable pitch propeller and contrarotating propellers, former being well known as advantageous in terms of soft thrust reversing, engine load control and overload protection, possibility of maintaining constant RPM for an PTO generator drive and cleaner environment and later being known as propulsive device having proppeler efficiency far

exceeding those inherent to single propeller, jet recuding the overall diameter to abt 80% of single propeller diameter.

Basically, pitch control concept of each one of the propellers put in contra rotating relation, uses well known mechanic developed by any one of the major CPP systems manufacturers.

Pitch actuating servo unit can have cylinder arranged at a number of usual positions, such as, within gearbox, at gearbox front side, forward or aft of bevel gear within strut supported body of rotatable or transverse thrusters, on the shaft itself, or in propeller hub. For the sake of compactness hub integrated cylinder version is described within the scope of invention, although any one of the said arrangements can be used as well.

In the heart of the patented mechanism there are two yokes (1 and 2) fitted on the pitch controling rod (3) thereof one (1) belonging to "inner" propeller hub (6) being in conventional arrangement while another (2), entitled to acts on "outer" hub (7) propeller blades, is provided with both sides axial bearings (4) to allow transfer of longitudinal forces while active ring, (5) fitted to pitch controlling rod (3), rotates in oposite direction, together with "inner" propeller (6).

Although pitch controling rod (3) drives both yokes in the same longitudinal direction desired pitch change of the propeller blades of "inner" and "outer" propeller is attained by blade cranks (8) being fitted at opposite sides of the blades flanges (12), producing therefore blades (9) rotation in opposite directions as well.

As it is evident, zero pitch of both propellers is at central position of pitch controlling rod and pitch change, arising from the momevent of the rod to any direction. will produce thrust of both propellers in the same desired direction.

CLAIMS

1. Patent is requested for mechanism controling pitch of the contrarotating propellers, fitted to fixed strut in pulling or pushing arrangement and featuring common servo piston and servo piston rod for both propellers, fitted on inner shaft hub in a way that piston rod and inner hub jake rotate in one direction while outer hub joke rotates with outer hub and relative motion and longitudinal forces are taken over by odequate bearings however due to provision of joke pins or pin block guides on the oposite sides of the jokes, movement of servo piston rod in one direction produces pitch change of centra rotating propellers in diferent directions creating thrust of the both propellers in the same desired direction. (Fig.1)
2. A unit as set forth in claim 1 in which the servo cylinder (14) is flanged to the bevel gear of inner propeller shaft. (Fig 2)
3. A unit as cat forth in claim 1 or 2 in which strut is not fixed but whole unit is of rotatable (steerable) execution.
4. A system as set forth in claim 1 or 2 with outer (11) and inner (10) shafts fitted within conventional sterntube (15) with addition of gear box (16) entitled to produce contra-rotation of driving (inner) and following (outer) shafts by means of set of bevel gears, whereof intermediate gears (17) being fixed to gear housing (18) while oil supply / feed back unit (19) is regularly mounted at the forward end of reduction gear box (20). (Fig 3)
5. A system as set forth in claim 4 but with gear box (16) incorporated within reduction gear box (20) with the aim to reduce total production, installation and maintenance costs.

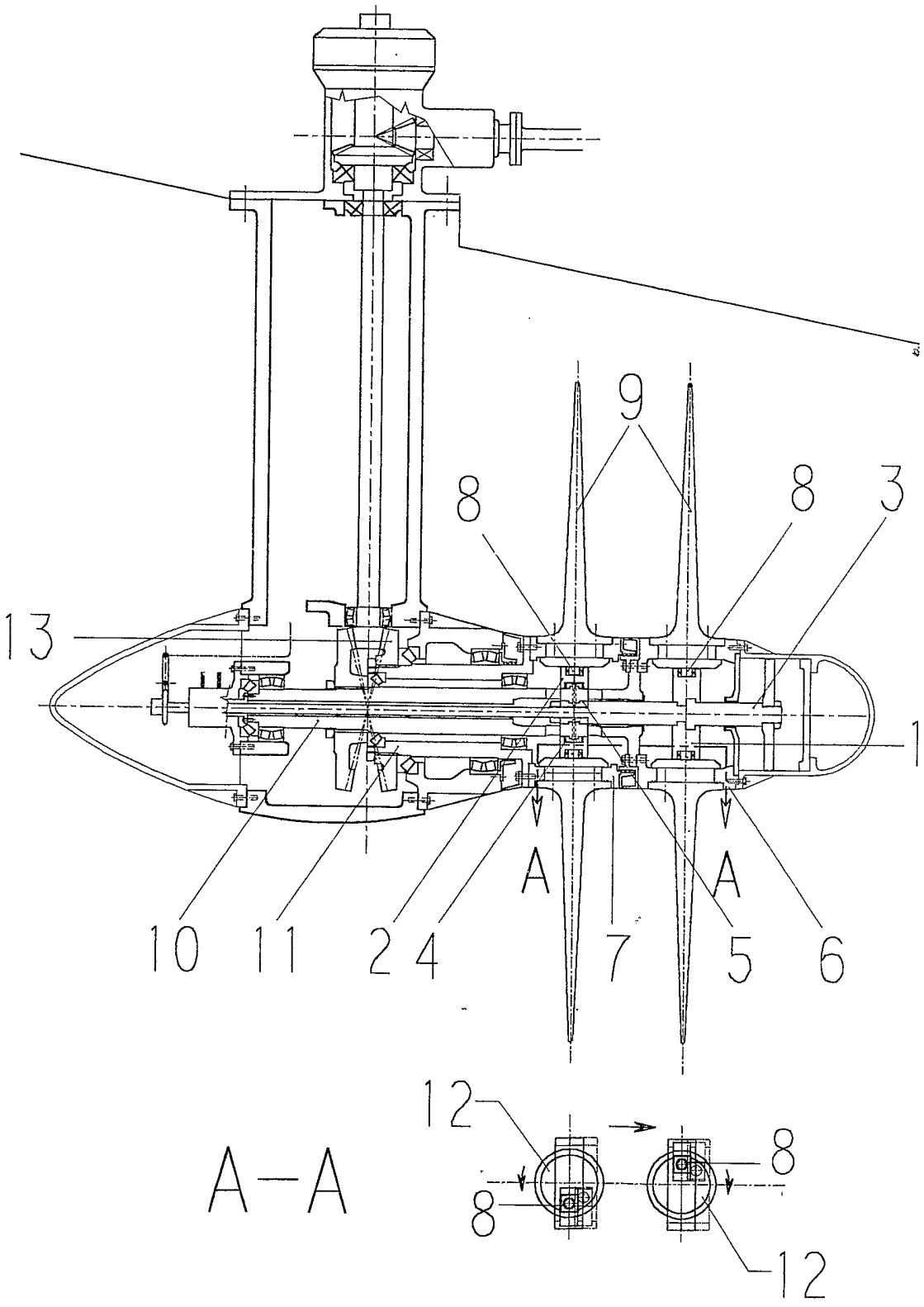


Fig. 1

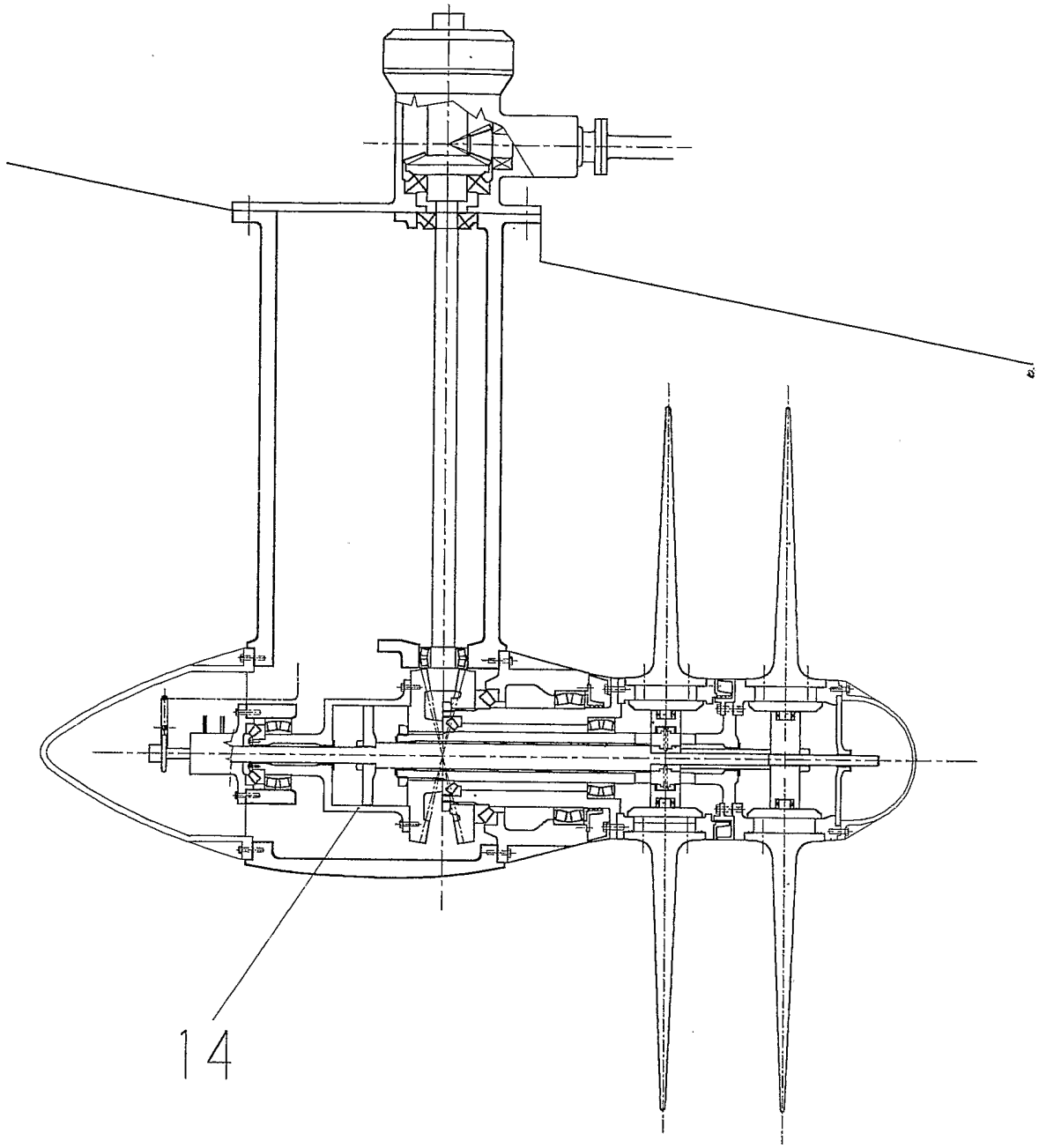


Fig. 2

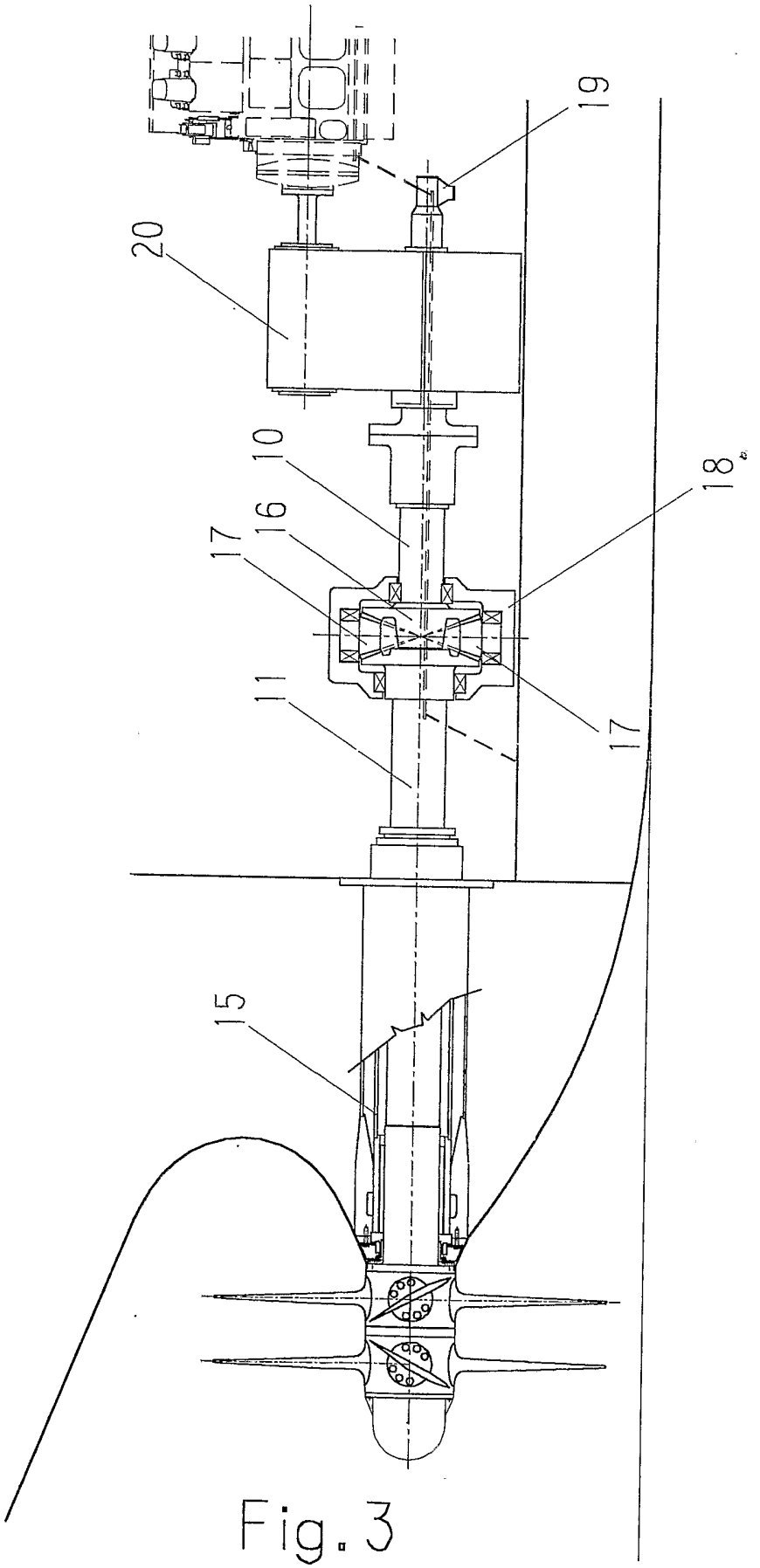


Fig. 3

INTERNATIONAL SEARCH REPORT

International Application No
PCT/HR 03/00044

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 B63H5/10 B63H3/08

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 B63H B64C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	FR 949 767 A (ROTOL LTD) 8 September 1949 (1949-09-08) page 1, line 38 -page 2, line 75; figure 1	1,3-5
Y	FR 2 083 882 A (ROSTOCK DIESELMOTOREN) 17 December 1971 (1971-12-17) page 4, line 14 -page 5, line 32; figures 1-4	1,3-5
Y	DE 10 37 908 B (SCHIFFBAU PROJEKT UND KONSTRUK) 28 August 1958 (1958-08-28) column 2, line 34 -column 4, line 4; figure 1	3
Y	US 5 480 330 A (BROWN PETER W) 2 January 1996 (1996-01-02) column 2, line 30 - line 39 column 3, line 49 - line 53; figure 1	4,5

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[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
21 May 2004	03/06/2004

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31–70) 340–2040, Tx. 31 651 epo nl, Fax: (+31–70) 340–3016	DE SENA HERNAND.., A

INTERNATIONAL SEARCH REPORT

International Application No
PCT/HR 03/00044

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

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