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Section I

Title: Fan Rotor For Turbofan Engines

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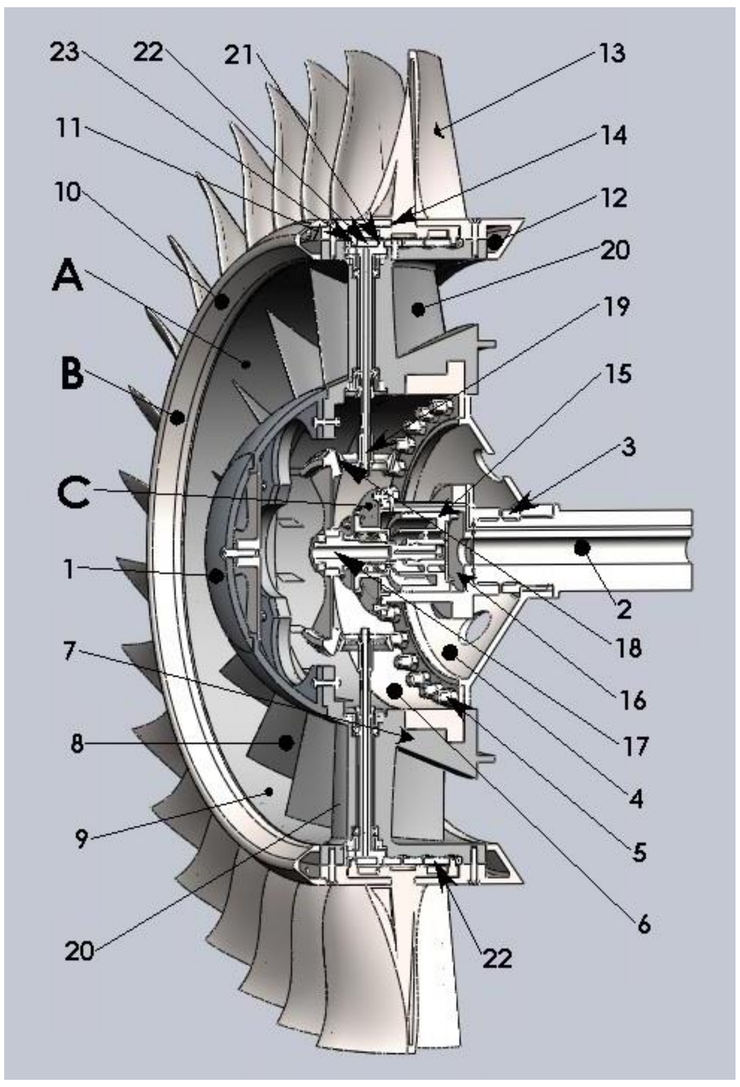
Author/s: Panaitescu Costin, Catană Răzvan Marius

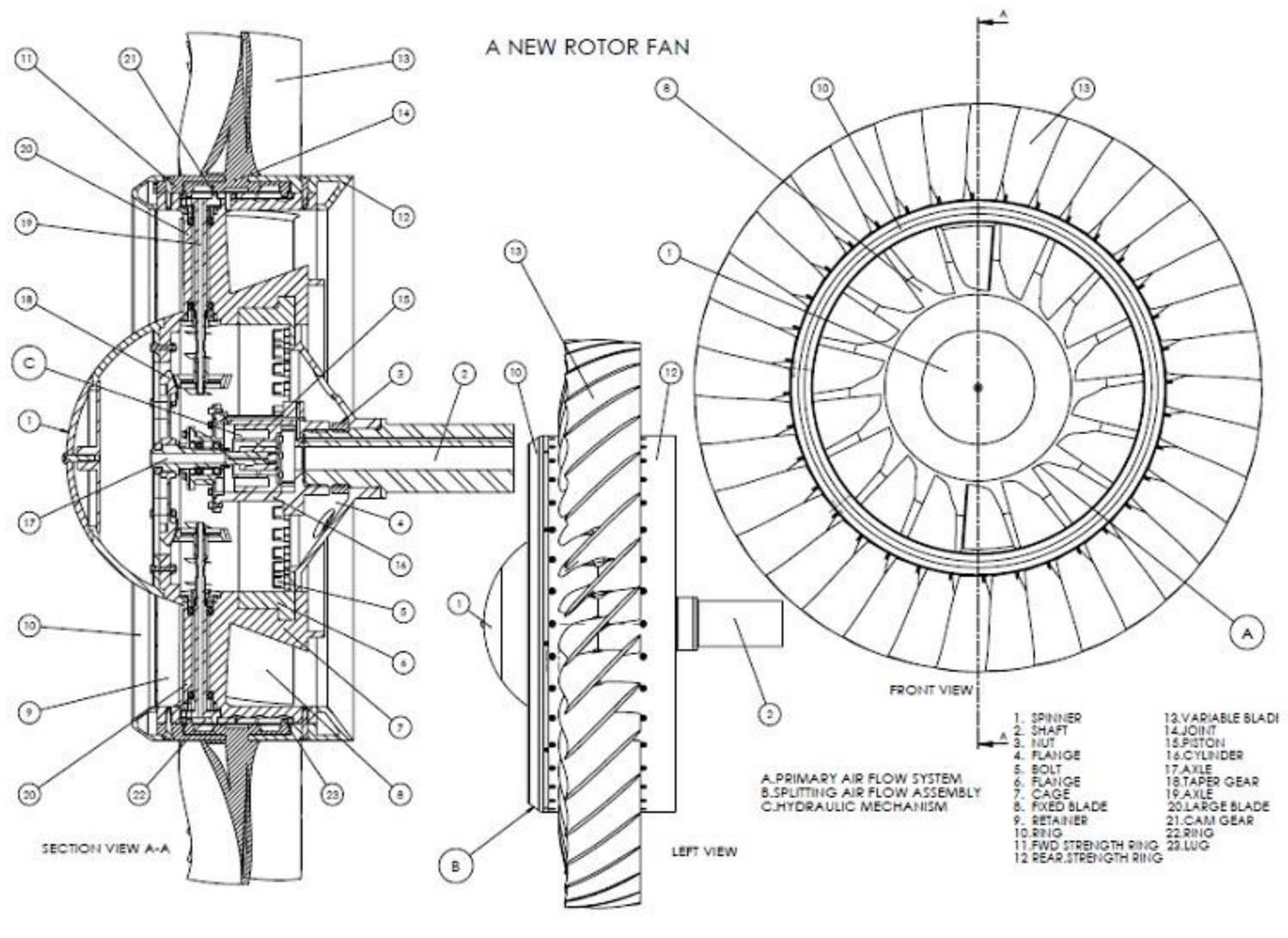
General Description:

The invention is referring to a new fan rotor configuration and constructive solution, for turbofan engines, a fan rotor that is split in two different sections rotors, a section with fix pitch blades dedicated for engine primary flow, and a section with variable pitch blades dedicated for engine secondary flow. This new fan rotor is designed for a secondary flow optimization at different engine working regimes, in order to decrease the specific fuel consumption and to reduce the gas emissions of turbofan engine

Technical Description:

The new fan rotor configuration consisting of an assembly **A,** a fan rotor section dedicated for the inlet of the engine primary air flow, a ring assembly **B** that splits the fan rotor in two rotor sectors for primary and secondary air flow and a hydraulic mechanism **C** for changing the blades pitch of fan rotor section for secondary air flow. The assembly **A** is one frame rotor section with fix pitch blades **8** with a top circumferential sector **9** that serves as a frame installation for blades of the secondary flow rotor section. The assembly **A** contains two particular blades **20**, fixed diametrically opposite, through which the transmission shaft **19** is passed to drive the internal mechanism **22**, from the ring assembly **B**, to adjust the blades **13** pitch for the fan rotor section of secondary flow. The hydraulic mechanism **C**, receives oil pressure from the engine on piston **15**, which rotate the shaft **17** and by the bevel gear **18**, it drives the transmission shafts **19**.





Particularities:

1.The new fan rotor is designed to increase the fan efficiency or to be more efficient on different engine working regimes.

2.The new fan rotor can have different overall pressure ratio between rotor section of primary flow and secondary flow.

3.The new fan rotor has variable bypass ratio, depending on engine working regimes.

4.Best performances of new fan rotor are obtained by changing the stagger blade angle of secondary air flow in relation to maintaining engine shaft speed constant, without affecting primary air flow characteristics.

5.The new fan rotor can be developed for the next generation of turbofan engines; currently a fan with variable blades is applied on engine demonstrator named ultra high bypass ratio (UHBR), by Rolls Royce engine manufacturer.

Advantages: The new fan rotor provides significant advantages over the classical fan, including.

1.Allows a better optimization of the engine secondary air flow, because it has variable pitch blades on secondary flow rotor section.

2.Allows a better optimization of load distribution between the engine primary flow and secondary flow.

3.Allows to be mounted a different number of blades between section rotor, to decrease the blade density, and to mount blades with higher chord, to increase aerodynamic load.

4.Improves the operating working line of turbofan engine.

5.Following a global calculation, in some ideal conditions, allows to convert between 50÷60 % of fuel's energy into propulsion, than 40% potential energy stored in the fuel in case of classical fan.

Contact: Author's Email:

razvan.catana@comoti.ro, catana_razvan.marius@yahoo.com, Phone: +40763181775Email: panaitescu.costin@yahoo.com, Phone: +40744511155