

**CPC****COOPERATIVE PATENT CLASSIFICATION****F01D**

**NON-POSITIVE DISPLACEMENT MACHINES OR ENGINES, e.g. STEAM TURBINES** (machines or engines for liquids [F03](#) ; non-positive displacement pumps [F04D](#) )

**NOTE**

This subclass covers:

- non-positive-displacement engines for elastic fluids, e.g. steam turbines;
- non-positive-displacement engines for liquids and elastic fluids;
- non-positive-displacement machines for elastic fluids;
- non-positive-displacement machines for liquids and elastic fluids.

Attention is drawn to the Notes preceding class [F01](#) , especially as regards the definitions of "reaction type", e.g. with airfoil-like blades, and "impulse type", e.g. bucket turbines.

**WARNING**

The following IPC groups are not used in the CPC system. Subject matter covered by these groups is classified in the following CPC groups:

[F01D 5/32](#) covered by [F01D 5/30](#)

**Guidance heading:**

- |                            |   |
|----------------------------|---|
| <b>F01D 1/00</b>           | <b>Non-positive-displacement machines or engines, e.g. steam turbines</b> (with working-fluid flows in opposite axial directions for balancing axial thrust <a href="#">F01D 3/02</a> ; with other than pure rotation <a href="#">F01D 23/00</a> ; turbines characterised by their use in special steam systems, cycles, or processes, regulating devices therefor <a href="#">F01K</a> ) |
| <a href="#">F01D 1/02</a>  | . with stationary working-fluid guiding means and bladed or like rotor, {e.g. multi-bladed impulse steam turbines } ( <a href="#">F01D 1/24</a> takes precedence; without stationary working-fluid guiding means <a href="#">F01D 1/18</a> )  |
| <a href="#">F01D 1/023</a> | .. {the working-fluid being divided into several separate flows ( <a href="#">F01D 3/02</a> takes precedence) ; several separate fluid flows being united in a single flow; the machine or engine having provision for two or more different possible fluid flow paths }  |
| <a href="#">F01D 1/026</a> | .. {Impact turbines with buckets, i.e. impulse turbines e.g. Pelton turbines ( <a href="#">F01D 1/16</a> , <a href="#">F01D 1/34</a> take precedence) }   |
| <a href="#">F01D 1/04</a>  | .. traversed by the working-fluid substantially axially   |
| <a href="#">F01D 1/06</a>  | .. traversed by the working-fluid substantially radially  |
| <a href="#">F01D 1/08</a>  | ... having inward flow  |
| <a href="#">F01D 1/10</a>  | .. having two or more stages subjected to working-fluid flow without essential intermediate pressure change, i.e. with velocity stages ( <a href="#">F01D 1/12</a> takes precedence)  |

- F01D 1/12 . . . with repeated action on same blade ring
- F01D 1/14 . . . . . traversed by the working-fluid substantially radially
- F01D 1/16 . . . characterised by having both reaction stages and impulse stages
- F01D 1/18 . . without stationary working-fluid guiding means; ([F01D 1/24](#), [F01D 1/32](#), [F01D 1/34](#) take precedence; {with pressure-velocity transformation exclusively in rotor [F01D 1/32](#) })
- F01D 1/20 . . . traversed by the working-fluid substantially axially
- F01D 1/22 . . . traversed by the working-fluid substantially radially
- F01D 1/24 . . characterised by counter-rotating rotors subjected to same working fluid stream without intermediate stator blades or the like
- F01D 1/26 . . . traversed by the working-fluid substantially axially
- F01D 1/28 . . . traversed by the working-fluid substantially radially
- F01D 1/30 . . characterised by having a single rotor operable in either direction of rotation, e.g. by reversing of blades ([combinations of machines or engines F01D 13/00](#))
- F01D 1/32 . . with pressure velocity transformation exclusively in rotor, e.g. the rotor rotating under the influence of jets issuing from the rotor, {e.g. [Heron turbines](#) (the working fluid being a combustion products [F02C 3/165](#); jet propulsion plants per se [F02K](#) ) }
- F01D 1/34 . . characterised by non-bladed rotor, e.g. with drilled holes ([F01D 1/32](#) takes precedence; [sirens G10K 7/00](#) {[impact turbines with buckets F01D 1/026](#); [hand-held tools with a non-bladed rotor F01D 15/067](#) })
- F01D 1/36 . . . using fluid friction
- F01D 1/38 . . . of the screw type
- F01D 3/00** **Machines or engines with axial-thrust balancing effected by working-fluid**
- F01D 3/02 . . characterised by having one fluid flow in one axial direction and another fluid flow in the opposite direction
- F01D 3/025 . . . {with a centrally disposed radial stage }
- F01D 3/04 . . axial thrust being compensated by thrust-balancing dummy piston or the like
- F01D 5/00** **Blades; Blade-carrying members ([nozzle boxes F01D 9/02](#)) ; Heating, heat-insulating, cooling or anti-vibration means on the blades or the members {special arrangements in rotors dealing with breaking off of part thereof [F01D 21/045](#) }**
- F01D 5/005 . . {Repairing methods or devices }
- F01D 5/02 . . Blade-carrying members, e.g. rotors ([rotors of non-bladed type F01D 1/34](#); [stators F01D 9/00](#)) {selecting particular materials [F01D 5/28](#) }
- F01D 5/021 . . . {for flow machines or engines with only one axial stage (for more than one stage [F01D 5/06](#)) }
- F01D 5/022 . . . {with concentric rows of axial blades }
- F01D 5/023 . . . {of the screw type }
- F01D 5/025 . . . {Fixing blade carrying members on shafts ([attachment of a member on a shaft in](#)

- general [F16D 1/06](#); for non-positive displacement pumps [F04D 29/00](#) }
- F01D 5/026 .. {Shaft to shaft connections }
- F01D 5/027 .. {Arrangements for balancing (for balancing rotating bodies in general [F16F 15/32](#); for compensating unbalance [G01M 1/36](#) ) }
- F01D 5/028 .. {the rotor disc being formed of sheet laminae (rotor blade aggregates of unitary construction [F01D 5/34](#) ) }
- F01D 5/03 .. Annular blade-carrying members having blades on the inner periphery of the annulus and extending inwardly radially, i.e. inverted rotors
- F01D 5/04 .. for radial-flow machines or engines
- F01D 5/041 ... {of the Ljungström type }
- F01D 5/043 ... {of the axial inlet- radial outlet, or vice-versa, type }
- F01D 5/045 .... {the wheel comprising two adjacent bladed wheel portions e.g. with interengaging blades for damping vibrations }
- F01D 5/046 .... {Heating, heat insulation or cooling means }
- F01D 5/048 .... {Form or construction }
- F01D 5/06 .. Rotors for more than one axial stage, e.g. of drum or multiple disc type; Details thereof, e.g. shafts, shaft connections {[F01D 5/022](#), [F01D 5/023](#) take precedence }
- F01D 5/063 ... {Welded rotors (welding per se [B23K](#) ) }
- F01D 5/066 ... {Connecting means for joining rotor-discs or rotor-elements together, e.g. by a central bolt, by clamps }
- F01D 5/08 .. Heating, heat-insulating or cooling means {specially adapted for radial flow machines or engines [F01D 5/04](#) }
- F01D 5/081 ... {Cooling fluid being directed on the side of the rotor disc or at the roots of the blades ([F01D 5/087](#) takes precedence) }
- F01D 5/082 .... {on the side of the rotor disc }
- F01D 5/084 .... {the fluid circulating at the periphery of a multistage rotor, e.g. of drum type }
- F01D 5/085 ... {cooling fluid circulating inside the rotor }
- F01D 5/087 .... {in the radial passages of the rotor disc }
- F01D 5/088 .... {in a closed cavity }
- F01D 5/10 .. Anti- vibration means { (specially adapted for radial flow machines or engines [F01D 5/04](#) ) }
- F01D 5/12 . Blades ( {specially adapted for radial flow machines or engines [F01D 5/04](#) }; blade roots [F01D 5/30](#); rotors with blades adjustable in operation [F01D 7/00](#); stator blades [F01D 9/02](#) )
- F01D 5/14 .. Form or construction (selecting particular materials, measures against erosion or corrosion [F01D 5/28](#))
- F01D 5/141 ... {Shape, i.e. outer, aerodynamic form ([F01D 5/148](#) to [F01D 5/20](#) take precedence; blade construction [F01D 5/147](#) ) }
- F01D 5/142 .... {of the blades of successive rotor or stator blade-rows }
- F01D 5/143 ..... {Contour of the outer or inner working fluid flow path wall, i.e. shroud or hub contour }
- F01D 5/145 .... {Means for influencing boundary layers or secondary circulations (for compressors [F04D 29/68](#) ) }
- F01D 5/146 .... {of blades with tandem configuration, split blades or slotted blades }
- F01D 5/147 ... {Construction, i.e. structural features, e.g. of weight-saving hollow blades ([F01D 5/148](#), [F01D 5/16](#) and [F01D 5/20](#) take precedence; blade shape [F01D 5/141](#); blades with cooling or heating channels or cavities [F01D 5/18](#);

		heating, heat-insulating or cooling means on blades <a href="#">F01D 5/18</a> }
<a href="#">F01D 5/148</a>	...	{Blades with variable camber, e.g. by ejection of fluid }
<a href="#">F01D 5/16</a>	...	for counteracting blade vibration
<a href="#">F01D 5/18</a>	...	Hollow blades, {i.e. blades with cooling or heating channels or cavities (structure of hollow blades in general <a href="#">F01D 5/147</a> ) }; Heating, heat-insulating or cooling means on blades
<a href="#">F01D 5/181</a>	....	{Blades having a closed internal cavity containing a cooling medium, e.g. sodium }
<a href="#">F01D 5/182</a>	....	{Transpiration cooling }
<a href="#">F01D 5/183</a>	.....	{Blade walls being porous }
<a href="#">F01D 5/184</a>	.....	{Blade walls being made of perforated sheet laminae }
<a href="#">F01D 5/185</a>	....	{Liquid cooling ( <a href="#">F01D 5/181</a> takes precedence) }
<a href="#">F01D 5/186</a>	....	{Film cooling ( <a href="#">F01D 5/187</a> takes precedence) }
<a href="#">F01D 5/187</a>	....	{Convection cooling }
<a href="#">F01D 5/188</a>	.....	{with an insert in the blade cavity to guide the cooling fluid, e.g. forming a separation wall }
<a href="#">F01D 5/189</a>	.....	{the insert having a tubular cross-section, e.g. airfoil shape }
<a href="#">F01D 5/20</a>	...	Specially-shaped blade tips to seal space between tips and stator { ( <a href="#">F01D 5/225</a> takes precedence) }
<a href="#">F01D 5/22</a>	..	Blade-to-blade connections, {e.g. for damping vibrations }
<a href="#">F01D 5/225</a>	...	{by shrouding }
<a href="#">F01D 5/24</a>	...	using wire or the like
<a href="#">F01D 5/26</a>	..	Antivibration means not restricted to blade form or construction or to blade-to-blade connections {or to the use of particular materials }
<a href="#">F01D 5/28</a>	..	Selecting particular materials; {Particular measures relating thereto; } Measures against erosion or corrosion
<a href="#">F01D 5/282</a>	...	{Selecting composite materials, e.g. blades with reinforcing filaments }
<a href="#">F01D 5/284</a>	...	{Selection of ceramic materials }
<a href="#">F01D 5/286</a>	...	{Particular treatment of blades, e.g. to increase durability or resistance against corrosion or erosion ( <a href="#">F01D 5/288</a> takes precedence) }
<a href="#">F01D 5/288</a>	...	{Protective coatings for blades }
<a href="#">F01D 5/30</a>	.	Fixing blades to rotors; Blade roots; {Blade spacers }
<a href="#">F01D 5/3007</a>	..	{of axial insertion type }
<a href="#">F01D 5/3015</a>	...	{with side plates }
<a href="#">F01D 5/3023</a>	..	{of radial insertion type, e.g. in individual recesses }
<a href="#">F01D 5/303</a>	...	{in a circumferential slot }
<a href="#">F01D 5/3038</a>	....	{the slot having inwardly directed abutment faces on both sides }
<a href="#">F01D 5/3046</a>	...	{the rotor having ribs around the circumference }
<a href="#">F01D 5/3053</a>	..	{by means of pins }
<a href="#">F01D 5/3061</a>	..	{by welding, brazing }
<a href="#">F01D 5/3069</a>	..	{between two discs or rings }
<a href="#">F01D 5/3076</a>	..	{Sheet metal discs }
<a href="#">F01D 5/3084</a>	..	{the blades being made of ceramics }
<a href="#">F01D 5/3092</a>	..	{Protective layers between blade root and rotor disc surfaces, e.g. anti-friction }

layers ([F01D 5/288](#) takes precedence) }

- F01D 5/32 . Locking, e.g. by final locking blades or keys
- F01D 5/323 . . { Locking of axial insertion type blades by means of a key or the like parallel to the axis of the rotor }
- F01D 5/326 . . { Locking of axial insertion type blades by other means }
- F01D 5/34 . Rotor-blade aggregates of unitary construction {e.g. formed of sheet laminae; (discs formed of sheet laminae [F01D 5/028](#); Ceramic materials [F01D 5/284](#), composite materials [F01D 5/282](#)) }
  
- F01D 7/00 Rotors with blades adjustable in operation; Control thereof** (for reversing [F01D 1/30](#))
  
- F01D 7/02 . having adjustment responsive to speed
  
- F01D 9/00 Stators** (non-fluid guiding aspects of casings, regulating, controlling, or safety aspects, see the relevant groups)
  
- F01D 9/02 . Nozzles; Nozzle boxes; Stator blades; Guide conduits { e.g. individual nozzles (nozzle boxes [F01D 9/047](#)) }
- F01D 9/023 . . {Transition ducts between combustor cans and first stage of the turbine in gas-turbine engines; their cooling or sealings }
- F01D 9/026 . . {Scrolls for radial machines or engines }
- F01D 9/04 . . forming ring or sector
- F01D 9/041 . . . {using blades ([F01D 5/148](#) takes precedence) }
- F01D 9/042 . . . {fixing blades to stators (fixing stator-rings in the casing or to each other [F01D 25/246](#)) }
- F01D 9/044 . . . . {permanently, e.g. by welding, brazing, casting or the like }
- F01D 9/045 . . . {for radial flow machines or engines }
- F01D 9/047 . . . {Nozzle boxes }
- F01D 9/048 . . . {for radial admission }
  
- F01D 9/06 . Fluid supply conduits to nozzles or the like
- F01D 9/065 . . {Fluid supply or removal conduits traversing the working fluid flow, e.g. for lubrication-, cooling- ,or sealing fluids (see also [F01D 25/16](#), [F01D 25/24](#) and [F01D 25/26](#)) }
  
- F01D 11/00 Preventing or minimising internal leakage of working-fluid, e.g. between stages** (sealings in general [F16J](#) ) {sealing arrangements for transition ducts of combustor cans [F01D 9/023](#) }
  
- F01D 11/001 . {for sealing space between stator blade and rotor }
- F01D 11/003 . {by packing rings; Mechanical seals }
- F01D 11/005 . {Sealing means between non relatively rotating elements }
- F01D 11/006 . . {Sealing the gap between rotor blades or blades and rotor }
- F01D 11/008 . . . {by spacer elements between the blades, e.g. independent interblade platforms }

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- F01D 11/02 . by non-contact sealings, e.g. of labyrinth type (for sealing space between rotor blade tips and stator [F01D 11/08](#))
- F01D 11/025 . . {Seal clearance control; Floating assembly; Adaptation means to differential thermal dilatations }
- F01D 11/04 . . using sealing fluid, e.g. steam
- F01D 11/06 . . . Control thereof
- F01D 11/08 . for sealing space between rotor blade tips and stator (specially-shaped blade tips therefor [F01D 5/20](#))
- F01D 11/10 . . using sealing fluid, e.g. steam
- F01D 11/12 . . using a rubstrip, e.g. erodible. deformable or resiliently-biased part
- F01D 11/122 . . . {with erodable or abradable material (blades having cutting or grinding tips [F01D 5/20](#)) }
- F01D 11/125 . . . . {with a reinforcing structure }
- F01D 11/127 . . . {with a deformable or crushable structure, e.g. honeycomb }
- F01D 11/14 . . Adjusting or regulating tip-clearance, i.e distance between rotor-blade tips and stator casing (rotors with blades adjustable in operation [F01D 7/00](#))
- F01D 11/16 . . . by self-adjusting means ([F01D 11/12](#) takes precedence)
- F01D 11/18 . . . . using stator or rotor components with predetermined thermal response, e.g. selective insulation, thermal inertia, differential expansion
- F01D 11/20 . . . Actively adjusting tip-clearance
- F01D 11/22 . . . . by mechanically actuating the stator or rotor components, e.g. moving shroud sections relative to the rotor
- F01D 11/24 . . . . by selectively cooling-heating stator or rotor components
- F01D 13/00** **Combinations of two or more machines or engines** ([F01D 15/00](#) takes precedence; regulating or controlling, see the relevant groups; combinations of two or more pumps [F04](#) ; fluid gearing [F16H](#) )
- F01D 13/003 . {with at least two independent shafts, i.e. cross-compound }
- F01D 13/006 . {one being a reverse turbine }
- F01D 13/02 . Working-fluid interconnection of machines or engines
- F01D 15/00** **Adaptations of machines or engines for special use; Combinations of engines with devices driven thereby** (regulating or controlling see the relevant groups; aspects predominantly concerning driven devices, see the relevant classes for the devices)
- F01D 15/005 . {Adaptations for refrigeration plants }
- F01D 15/02 . Adaptations for driving vehicles, e.g. locomotives (arrangement in vehicles, see the relevant vehicle classes)
- F01D 15/04 . . the vehicles being waterborne vessels
- F01D 15/045 . . . {Control thereof }
- F01D 15/06 . Adaptations for driving, or combinations with, hand-held tools or the like {control

- thereof }
- F01D 15/062 .. {Controlling means specially adapted therefor }
- F01D 15/065 .. {with pressure-velocity transformation exclusively in rotor }
- F01D 15/067 .. {characterised by non-bladed rotor }
- F01D 15/08 . Adaptations for driving, or combinations with, pumps
- F01D 15/10 . Adaptations for driving, or combinations with, electric generators
- F01D 15/12 . Combinations with mechanical gearing (driven by multiple engines [F01D 13/00](#))
- F01D 17/00** **Regulating or controlling by varying flow** (for reversing [F01D 1/30](#); by varying rotor-blade position [F01D 7/00](#); specially for starting [F01D 19/00](#); shutting-down [21/00](#); regulating or controlling in general [G05](#) ) { specially adapted for hand-held tools or the like [F01D 15/06](#) }
- F01D 17/02 . Arrangement of sensing elements (sensing elements per se: see the relevant subclasses)
- F01D 17/04 .. responsive to load
- F01D 17/06 .. responsive to speed
- F01D 17/08 .. responsive to condition of working-fluid, e.g. pressure
- F01D 17/085 ... {to temperature }
- F01D 17/10 . Final actuators (valves in general [F16K](#) ) {blades with variable camber [F01D 5/148](#) }
- F01D 17/105 .. {by passing part of the fluid }
- F01D 17/12 .. arranged in stator parts
- F01D 17/14 ... varying effective cross-sectional area of nozzles or guide conduits
- F01D 17/141 .... {by means of shiftable members or valves obturating part of the flow path }
- F01D 17/143 ..... {the shiftable member being a wall, or part thereof of a radial diffuser }
- F01D 17/145 ..... {by means of valves, e.g. for steam turbines (valves in general [F16K](#) ) }
- F01D 17/146 .... {by throttling the volute inlet of radial machines or engines }
- F01D 17/148 .... {by means of rotatable members, e.g. butterfly valves }
- F01D 17/16 .... by means of nozzle vanes
- F01D 17/162 ..... {for axial flow; i.e. the vanes turning around axes which are essentially perpendicular to the rotor centre line ([F01D 17/167](#) takes precedence) }
- F01D 17/165 ..... {for radial flow; i.e. the vanes turning around axes which are essentially parallel to the rotor centre line ([F01D 17/167](#) takes precedence) }
- F01D 17/167 ..... {of vanes moving in translation }
- F01D 17/18 ... varying effective number of nozzles or guide conduits {e.g. sequentially operable valves for steam turbines }
- F01D 17/20 . Devices dealing with sensing elements or final actuators or transmitting means between them, e.g. power-assisted (sensing elements alone [F01D 17/02](#); final actuators alone [F01D 17/10](#))
- F01D 17/205 .. {Centrifugal governors directly linked to valves }
- F01D 17/22 .. the operation or power assistance being predominantly non-mechanical



F01D 17/24	. . . electrical
F01D 17/26	. . . fluid, e.g. hydraulic
<b>F01D 19/00</b>	<b>Starting of machines or engines; Regulating, controlling, or safety means in connection therewith</b> ( <a href="#">warming-up before starting F01D 25/10</a> ; <a href="#">turning or inching gear F01D 25/34</a> )
F01D 19/02	. dependent on temperature of component parts, e.g. of turbine-casing
<b>F01D 21/00</b>	<b>Shutting-down of machines or engines, e.g. in emergency; Regulating, controlling, or safety means not otherwise provided for</b>
F01D 21/003	. { <a href="#">Arrangements for testing or measuring</a> ( <a href="#">for measuring vibrations G01H</a> ) }
F01D 21/006	. { <a href="#">Arrangements of brakes</a> ( <a href="#">brakes per se F16D</a> ) }
F01D 21/02	. Shutting-down responsive to overspeed
F01D 21/04	. responsive to undesired position of rotor relative to stator { <a href="#">or to breaking-off of a part of the rotor</a> }, e.g. indicating such position
F01D 21/045	. . { <a href="#">special arrangements in stators or in rotors dealing with breaking-off of part of rotor</a> }
F01D 21/06	. . Shutting-down
F01D 21/08	. . Restoring position
F01D 21/10	. responsive to unwanted deposits on blades, in working-fluid conduits or the like
F01D 21/12	. responsive to temperature
F01D 21/14	. responsive to other specific conditions
F01D 21/16	. Trip gear
F01D 21/18	. . involving hydraulic means
F01D 21/20	. Checking operation of shut-down devices
<b>F01D 23/00</b>	<b>Non-positive-displacement machines or engines with movement other than pure rotation, e.g. of endless-chain type</b>
<b>F01D 25/00</b>	<b>Component parts, details, or accessories, not provided for in, or of interest apart from, other groups</b>
F01D 25/002	. { <a href="#">Cleaning of turbomachines</a> }
F01D 25/005	. { <a href="#">Selecting particular materials</a> }
F01D 25/007	. { <a href="#">Preventing corrosion</a> }
F01D 25/02	. De-icing means for engines having icing phenomena



- F01D 25/04 . Antivibration arrangements
- F01D 25/06 . . for preventing blade vibration (means on blade-carrying members or blades 5/00)
- F01D 25/08 . Cooling (of machines or engines in general [F01P](#) ) ; Heating; Heat-insulation (of blade-carrying members, of blades [F01D 5/00](#))
- F01D 25/10 . . Heating, e.g. warming-up before starting
- F01D 25/12 . . Cooling
- F01D 25/125 . . . {of bearings }
- F01D 25/14 . . Casings modified therefor (double casings [F01D 25/26](#))
- F01D 25/145 . . . {Thermally insulated casings }
- F01D 25/16 . Arrangement of bearings; Supporting or mounting bearings in casings (bearings per se [F16C](#) )
- F01D 25/162 . . {Bearing supports }
- F01D 25/164 . . . {Flexible supports; Vibration damping means associated with the bearing }
- F01D 25/166 . . {Sliding contact bearing (gas bearings [F01D 25/22](#)) }
- F01D 25/168 . . . {for axial load mainly }
- F01D 25/18 . Lubricating arrangements (of machines or engines in general [F01M](#) )
- F01D 25/183 . . {Sealing means }
- F01D 25/186 . . . {for sliding contact bearing }
- F01D 25/20 . . using lubrication pumps
- F01D 25/22 . . using working-fluid or other gaseous fluid as lubricant
- F01D 25/24 . Casings (modified for heating or cooling [F01D 25/14](#) ) ; Casing parts, e.g. diaphragms, casing fastenings (casings for rotary machines or engines in general [F16M](#) ) {special arrangements in stators dealing with breaking-off of part of rotor [F01D 21/045](#) }
- F01D 25/243 . . { Flange connections; Bolting arrangements ([F01D 25/265](#) takes precedence) }
- F01D 25/246 . . {Fastening of diaphragms or stator-rings }
- F01D 25/26 . . Double casings; Measures against temperature strain in casings
- F01D 25/265 . . . {Vertically split casings; Clamping arrangements therefor }
- F01D 25/28 . Supporting or mounting arrangements, e.g. for turbine casing
- F01D 25/285 . . {Temporary support structures, e.g. for testing, assembling, installing, repairing; Assembly methods using such structures }
- F01D 25/30 . Exhaust heads, chambers, or the like
- F01D 25/305 . . {with fluid, e.g. liquid injection }
- F01D 25/32 . Collecting of condensation water; Drainage {Removing solid particles }
- F01D 25/34 . Turning or inching gear
- F01D 25/36 . . using electric motors