CPC COOPERATIVE PATENT CLASSIFICATION

F MECHANICAL ENGINEERING; LIGHTING; HEATING; WEAPONS; BLASTING
(NOTE omitted)

LIGHTING; HEATING

F24 HEATING; RANGES; VENTILATING
(NOTE omitted)

F24S SOLAR HEAT COLLECTORS; SOLAR HEAT SYSTEMS (for producing mechanical power from solar energy F03G 6/00)

NOTE

In this subclass, the following terms or expressions are used with the meanings indicated:

- "solar heat collector modules", often referred to simply as "modules", covers;
  a. whole solar heat collectors
  b. elements of solar heat collectors, e.g. reflectors, lenses or heat storage elements.
- "absorbing elements" covers elements for absorbing solar-rays and converting it into heat.
- "solar heat systems" covers systems having solar heat collectors as their components and using the collected heat

10/00	**Solar heat collectors using working fluids**
10/10	. the working fluids forming pools or ponds
10/13	. . Salt-gradient ponds
10/17	. . using covers or floating solar absorbing elements
10/20	. having circuits for two or more working fluids (with means for exchanging heat between two or more fluids F24S 10/30)
10/25	. having two or more passages for the same working fluid layered in direction of solar-rays, e.g. having upper circulation channels connected with lower circulation channels
10/30	. with means for exchanging heat between two or more working fluids
10/40	. in absorbing elements surrounded by transparent enclosures, e.g. evacuated solar collectors
10/45	. . {the enclosure being cylindrical}
10/50	. the working fluids being conveyed between plates
10/501	. . {having conduits of plastic material}
10/502	. . {having conduits formed by paired plates and internal partition means}
10/503	. . {having conduits formed by paired plates, only one of which is plane}
10/504	. . {having conduits formed by paired non-plane plates}
10/505	. . {having curved plate-like conduits, e.g. semi-spherical}
10/506	. . {having conduits formed by inflation of portions of a pair of joined sheets}
10/55	. . with enlarged surfaces, e.g. with protrusions or corrugations (collectors comprising porous materials or permeable masses directly contacting the working fluids F24S 10/80)
10/60	. the working fluids trickling freely over absorbing elements
10/70	. the working fluids being conveyed through tubular absorbing conduits
2010/71	. . {the conduits having a non-circular cross-section}
10/72	. . {the tubular conduits being integrated in a block; the tubular conduits touching each other}
10/73	. . {the tubular conduits being of plastic material}
10/74	. . {the tubular conduits are not fixed to heat absorbing plates and are not touching each other}
10/742	. . . {the conduits being parallel to each other}
10/744	. . . {the conduits being helically coiled}
10/746	. . . {the conduits being spirally coiled}
10/748	. . . {the conduits being otherwise bent, e.g. zig-zag}
10/75	. . with enlarged surfaces, e.g. with protrusions or corrugations (collectors comprising porous material or permeable masses directly contacting the working fluids F24S 10/80)
2010/751	. . . {Special fins}
2010/752	. . . . {extending obliquely}
10/753	. . . {the conduits being parallel to each other}
10/754	. . . {the conduits being spirally coiled}
10/755	. . . {the conduits being otherwise bent, e.g. zig-zag}
10/80	. comprising porous material or permeable masses directly contacting the working fluids (for conveying liquefied working fluid from evaporator sections to condenser sections with capillary force F24S 10/95)
10/90	. using internal thermosiphonic circulation
10/95	. . having evaporator sections and condenser sections, e.g. heat pipes
20/00	**Solar heat collectors specially adapted for particular uses or environments**
20/02	. {for swimming pools}
20/04	. {for showers}
2020/10	. {Solar modules layout; Modular arrangements}
2020/11	. . {in the form of multiple rows and multiple columns, all solar modules being coplanar}
2020/12	. . {Coplanar arrangements with frame overlapping portions}
2020/13	. . {Overlaying arrangements similar to roof tiles}

2020/14 . . {Stepped arrangements, e.g. in parallel planes, without module overlapping}
2020/15 . . {Non-parallel arrangements}
2020/16 . . {Preventing shading effects}
2020/17 . . {Arrangements of solar thermal modules combined with solar PV modules}
2020/18 . . {having a particular shape, e.g. prismatic, pyramidal}
2020/183 . . . {in the form of louvers}
2020/186 . . . {allowing change of position for optimization of heat collection}
20/20 . Solar heat collectors for receiving concentrated solar energy, e.g. receivers for solar power plants
2020/23 . . {movable or adjustable}
20/25 . . using direct solar radiation in combination with concentrated radiation
20/30 . Solar heat collectors for heating objects, e.g. solar cookers or solar furnaces
20/40 . Solar heat collectors combined with other heat sources, e.g. using electrical heating or heat from ambient air
20/50 . Rollable or foldable solar heat collector modules
20/55 . . made of flexible materials
20/60 . Solar heat collectors integrated in fixed constructions, e.g. in buildings
20/61 . . Passive solar heat collectors, e.g. operated without external energy source
20/62 . . in the form of fences, balustrades or handrails
20/63 . . in the form of windows
20/64 . . in the form of floor constructions, grounds or roads
20/66 . . in the form of facade constructions, e.g. wall constructions (in the form of shingles or tiles F24S 20/69)
20/67 . . in the form of roof constructions (in the form of shingles or tiles F24S 20/69)
20/69 . . in the form of shingles or tiles
20/70 . Waterborne solar heat collector modules (for working fluids forming pools or ponds F24S 10/10)
20/80 . Airborne solar heat collector modules, e.g. inflatable structures

21/00 Solar heat collectors not provided for in groups F24S 10/00-F24S 20/00

23/00 Arrangements for concentrating solar-rays for solar heat collectors

23/10 . {Prisms}
23/11 . {Fluorescent material}
23/12 . {Light guides}
23/30 . with lenses
23/31 . . {having discontinuous faces, e.g. Fresnel lenses}
23/70 . with reflectors
23/71 . . with parabolic reflective surfaces (with cylindro-parabolic reflective surfaces F24S 23/74)
23/715 . . . {flexible}
23/72 . . with hemispherical reflective surfaces
23/74 . . with trough-shaped or cylindro-parabolic reflective surfaces
23/745 . . . {flexible}
23/75 . . with conical reflective surfaces
23/77 . . with flat reflective plates
23/79 . . with spaced and opposed interacting reflective surfaces
23/80 . . {having discontinuous faces}
23/81 . . {flexible (F24S 23/715, F24S 23/745 take precedence)}
23/82 . . {characterised by the material or the construction of the reflector}
2023/83 . . {Other shapes}
2023/831 . . . {corrugated}
2023/832 . . . {curved}
2023/833 . . . {dish-shaped}
2023/834 . . . {trough-shaped}
2023/835 . . . . {asymmetric}
2023/836 . . . {spiral}
2023/837 . . . {hyperbolic}
2023/838 . . . {involutes}
2023/84 . . {Reflective elements inside solar collector casings}
2023/85 . . {Micro-reflectors}
2023/86 . . {in the form of reflective coatings}
2023/87 . . {Reflectors layout}
2023/872 . . . {Assemblies of spaced reflective elements on common support, e.g. Fresnel reflectors}
2023/874 . . . {Reflectors formed by assemblies of adjacent similar reflective facets}
2023/876 . . . {Reflectors formed by assemblies of adjacent reflective elements having different orientation or different features}
2023/878 . . . {Assemblies of spaced reflective elements in the form of grids, e.g. vertical or inclined reflective elements extending over heat absorbing elements}
2023/88 . . {Multi reflective traps}

25/00 Arrangement of stationary mountings or supports for solar heat collector modules

NOTE

Arrangements also intended for use with photovoltaic modules should further be classified in the relevant groups of subclass H02S.

2025/01 . {Special support components; Methods of use}
2025/011 . . {Arrangements for mounting elements inside solar collectors; Spacers inside solar collectors}
2025/012 . . {Foldable support elements}
2025/013 . . {Stackable support elements}
2025/014 . . {Methods for installing support elements}
2025/015 . . {Supports with play between elements}
2025/016 . . {Filling or spacing means; Elastic means}
2025/017 . . {Tensioning means}
2025/018 . . {Means for preventing movements, e.g. stops}
2025/019 . . {Means for accommodating irregularities on mounting surface; Tolerance compensation means}
2025/02 . . {Ballasting means}
2025/021 . . {Sealing means between support elements and mounting surface}
2025/022 . . {Sealing means between support elements, e.g. overlapping arrangements; Gap closing arrangements}
2025/023 . . {Means for preventing theft; Locking means}
25/10 . extending in directions away from a supporting surface
25/11 . . using shaped bodies, e.g. concrete elements, foamed elements or moulded box-like elements

25/12 . . using posts in combination with upper profiles
25/13 . . Profile arrangements, e.g. trusses (F24S 25/12 takes precedence)
25/15 . . using bent plates; using assemblies of plates
25/16 . . Arrangement of interconnected standing structures; Standing structures having separate supporting portions for adjacent modules
25/20 . Peripheral frames for modules
25/30 . using elongate rigid mounting elements extending substantially along the supporting surface, e.g. for covering buildings with solar heat collectors (extending in directions away from the supporting surface F24S 25/10; peripheral frames for modules F24S 25/20)
25/33 . . forming substantially planar assemblies, e.g. of coplanar or stacked profiles
25/35 . . . by means of profiles with a cross-section defining separate supporting portions for adjacent modules
25/37 . . . forming coplanar grids comprising longitudinal and transversal profiles
25/40 . using plate-like mounting elements, e.g. profiled or corrugated plates; Plate-like module frames (extending in directions away from a supporting surface F24S 25/10)
25/50 . comprising elongate non-rigid elements, e.g. straps, wires or ropes
25/60 . Fixation means, e.g. fasteners, specially adapted for supporting solar heat collector modules
2025/6001 . . {by using hook and loop-type fasteners}
2025/6002 . . {by using hooks}
2025/6003 . . {by clamping}
2025/6004 . . {by clipping, e.g. by using snap connectors}
2025/6005 . . {by screwed connection}
2025/6006 . . {by using threaded elements, e.g. stud bolts}
2025/6007 . . {by using form-fitting connection means, e.g. tongue and groove}
2025/6008 . . {by using toothed elements}
2025/6009 . . {by deforming the material, e.g. by crimping or clinching}
2025/601 . . {by bonding, e.g. by using adhesives}
2025/6011 . . {by welding or brazing}
2025/6012 . . {Joining different materials}
2025/6013 . . . {Joining glass with non-glass elements}
25/61 . . for fixing to the ground or to building structures
25/613 . . . in the form of bent strips or assemblies of strips; Hook-like connectors; Connectors to be mounted between building-covering elements
25/615 . . . for fixing to protruding parts of buildings, e.g. to corrugations or to standing seams
25/617 . . . Elements driven into the ground, e.g. anchor-piles; Foundations for supporting elements; Connectors for connecting supporting structures to the ground or to flat horizontal surfaces
25/63 . . for fixing modules or their peripheral frames to supporting elements
25/632 . . . Side connectors; Base connectors
25/634 . . . Clamps; Clips
25/636 . . . . clamping by screw-threaded elements
25/65 . . for coupling adjacent supporting elements, e.g. for connecting profiles together
25/67 . . for coupling adjacent modules or their peripheral frames (for fixing modules or their peripheral frames to supporting elements F24S 25/63)
25/70 . with means for adjusting the final position or orientation of supporting elements in relation to each other or to a mounting surface; with means for compensating mounting tolerances
2025/80 . {Special profiles}
2025/801 . . {having hollow parts with closed cross-section}
2025/802 . . {having circular or oval cross-section}
2025/803 . . {having a central web, e.g. I-shaped, inverted T-shaped}
2025/804 . . {U-, C- or O-shaped; Hat profiles}
2025/805 . . {in the form of corrugated profiles}
2025/806 . . {having curved portions}
2025/807 . . {having undercut grooves}

30/00 Arrangements for moving or orienting solar heat collector modules

NOTE

Arrangements also intended for use with photovoltaic modules should further be classified in the relevant groups of subclass H02S.

2030/10 . {Special components}
2030/11 . . {Driving means}
2030/115 . . . {Linear actuators, e.g. pneumatic cylinders}
2030/12 . . {Coupling means}
2030/13 . . {Transmissions}
2030/131 . . . {in the form of articulated bars}
2030/132 . . . . {in the form of compasses, scissors or parallelograms}
2030/133 . . . {in the form of flexible elements, e.g. belts, chains, ropes}
2030/134 . . . {in the form of gearings or rack-and-pinion transmissions}
2030/135 . . . {in the form of threaded elements}
2030/136 . . . {for moving several solar collectors by common transmission elements}
2030/137 . . . {for deriving one movement from another one, e.g. for deriving elevation movement from azimuth movement}
2030/14 . . {Movement guiding means}
2030/145 . . . {Tracks}
2030/15 . . {Bearings}
2030/16 . . {Hinged elements; Pin connections}
2030/17 . . {Spherical joints}
2030/18 . . {Load balancing means, e.g. use of counter-weights}
2030/19 . . {Movement dampening means; Braking means}
30/20 . for linear movement
30/40 . for rotary movement
30/42 . . with only one rotation axis
30/422 . . . Vertical axis
30/425 . . . Horizontal axis
30/428 . . . with inclined axis
30/45 . . with two rotation axes
30/452 . . . Vertical primary axis
30/455 . . . Horizontal primary axis
30/458 . . . with inclined primary axis
30/48 . . with three or more rotation axes or with multiple degrees of freedom

40/00 **Safety or protection arrangements of solar heat collectors; Preventing malfunction of solar heat collectors** (control arrangements F24S 50/00)
40/10 . Protective covers or shrouds; Closure members, e.g. lids (transparent coverings F24S 80/50)
40/20 . Cleaning; Removing snow
40/40 . Preventing corrosion; Protecting against dirt or contamination
40/42 . . Preventing condensation inside solar modules (by venting F24S 40/53)
40/44 . . Draining rainwater or condensation
40/46 . . Maintaining vacuum, e.g. by using getters
40/48 . . Deaerating or degassing the working fluid
40/50 . Preventing overheating or overpressure (by draining the working fluid F24S 40/60)
40/52 . . by modifying the heat collection, e.g. by defocusing or by changing the position of heat-receiving elements
40/53 . . by venting solar heat collector enclosures
40/55 . . Arrangements for cooling, e.g. by using external heat dissipating means or internal cooling circuits (by venting F24S 40/53)
40/57 . . Preventing overpressure in solar collector enclosures (by venting F24S 40/53)
40/58 . . Preventing overpressure in working fluid circuits
40/60 . Arrangements for draining the working fluid
40/70 . Preventing freezing (arrangements for draining the working fluid F24S 40/60)
40/80 . Accommodating differential expansion of solar collector elements
40/85 . . {Arrangements for protecting solar collectors against adverse weather conditions (F24S 40/10 takes precedence)}
40/90 . Arrangements for testing solar heat collectors

50/00 **Arrangements for controlling solar heat collectors**
50/20 . for tracking
2050/25 . . {Calibration means; Methods for initial positioning of solar concentrators or solar receivers}
50/40 . responsive to temperature
50/60 . responsive to wind
50/80 . for controlling collection or absorption of solar radiation

60/00 **Arrangements for storing heat collected by solar heat collectors** (working fluids forming pools or ponds F24S 10/10)
60/10 . using latent heat
60/20 . using chemical reactions, e.g. thermochemical reactions or isomerisation reactions
60/30 . storing heat in liquids

70/00 **Details of absorbing elements**
70/10 . characterised by the absorbing material (absorbing coatings or surface treatment for increasing absorption F24S 70/20)
70/12 . . made of metallic material
70/14 . . made of plastics
70/16 . . made of ceramic; made of concrete; made of natural stone
70/20 . characterised by absorbing coatings; characterised by surface treatment for increasing absorption
70/225 . . for spectrally selective absorption
70/25 . . Coatings made of metallic material
70/275 . . Coatings made of plastics
70/30 . Auxiliary coatings, e.g. anti-reflective coatings
70/60 . characterised by the structure or construction (absorbing coatings or surface treatment for increasing absorption F24S 70/20; auxiliary coatings F24S 70/30)
2070/62 . . {Heat traps}
70/65 . . Combinations of two or more absorbing elements

80/00 **Details, accessories or component parts of solar heat collectors not provided for in groups F24S 10/00-F24S 70/00**
2080/01 . {Selection of particular materials}
2080/011 . . {Ceramics}
2080/012 . . {Concrete}
2080/013 . . {Foams}
2080/014 . . {Carbone, e.g. graphite}
2080/015 . . {Plastics}
2080/016 . . {Textiles; Fabrics}
2080/017 . . {Natural materials, e.g. wood}
2080/018 . . {Recycled materials}
2080/03 . {Arrangements for heat transfer optimization}
2080/05 . . {Flow guiding means; Inserts inside conduits}
2080/07 . . {Arrangements for one-way heat transfer, e.g. thermal diodes}
2080/09 . {Arrangements for reinforcement of solar collector elements}
80/10 . Materials for heat-exchange conduits
80/20 . Working fluids specially adapted for solar heat collectors
80/30 . Arrangements for connecting the fluid circuits of solar collectors with each other or with other components, e.g. pipe connections; Fluid distributing means, e.g. headers
80/40 . Casings
80/45 . . characterised by the material
80/453 . . . made of metallic material
80/457 . . . made of plastics
80/50 . Elements for transmitting incoming solar rays and preventing outgoing heat radiation; Transparent coverings
2080/501 . . {Special shape}
2080/502 . . . {in the form of multiple covering elements}
2080/503 . . . {in the form of curved covering elements}
80/52 . . characterised by the material (for preventing heat loss F24S 80/56)
80/525 . . . made of plastics
80/54 . . using evacuated elements
80/56 . . characterised by means for preventing heat loss
80/58 . . characterised by their mountings or fixing means
80/60 . Thermal insulation (transparent coverings F24S 80/50)
80/65 . . characterised by the material
80/70 . Sealing means

90/00 **Solar heat systems not otherwise provided for**
90/10 . using thermosiphonic circulation

2201/00 **Prediction; Simulation**