CPC COOPERATIVE PATENT CLASSIFICATION

H01F MAGNETS ; INDUCTANCES ; TRANSFORMERS ; SELECTION OF MATERIALS FOR THEIR MAGNETIC PROPERTIES (ceramics based on ferrites C04B 35/26 ; alloys C22C ; { construction of loading coils H01B } ; thermomagnetic devices H01L 37/00 ; loudspeakers, microphones, gramophone pick-ups or like acoustic electromechanical transducers H04R)

NOTE

In this subclass, inductances and transformers are regarded as being "for power supply" if they are intended for this purpose even in systems operating at frequencies above 60 cycles/sec.

H01F 1/00 Magnets or magnetic bodies characterised by the magnetic materials therefor ; Selection of materials for their magnetic properties

H01F 1/0009 . { Antiferromagnetic materials, i.e. materials exhibiting a Néel transition temperature (H01F 1/0036 takes precedence) }

WARNING

This groups is not complete pending the completion of reclassification; see provisionally also H01F 1/00 - H01F 1/44 R

H01F 1/0018 . { Diamagnetic or paramagnetic materials, i.e. materials with low susceptibility and no hysteresis (H01F 1/0036 takes precedence) }

H01F 1/0027 . { Thick magnetic films (forming thick magnetic films H01F 41/16 ; magnetic record carriers G11B 5/70) }

NOTE

Group H01F 1/0036 takes precedence over groups H01F 1/09 , H01F 1/11 , H01F 1/20 , H01F 1/33 and H01F 1/36

H01F 1/0036 . { showing low dimensional magnetism, i.e. spin rearrangements due to a restriction of dimensions, e.g. showing giant magnetoresistivity, (H01F 1/153 , H01F 1/42 and H01F 10/00 take precedence; magnetoresistive sensors G01D 5/16 , G01R 33/06 ; magnetoresistive recording G11B 5/39 ; magnetic-field-controlled resistors H01L 43/08) }

H01F 1/0045 . . { Zero dimensional, e.g. nanoparticles, soft nanoparticles for medical/biological use (preparation of fullerenes in general C01B 31/0206) }

H01F 1/0054 . . . { Coated nanoparticles, e.g. nanoparticles coated with organic surfactant }

H01F 1/0063 . . . { in a non-magnetic matrix, e.g. granular solids (granular films H01F 10/007) }

H01F 1/0072 . . { one dimensional, i.e. linear or dendritic nanostructures }

H01F 1/0081 . . . { in a non-magnetic matrix, e.g. Fe-nanowires in a nanoporous membrane }

H01F 1/009 . . { bidimensional, e.g. nanoscale period nanomagnet arrays (H01F 10/007 takes precedence) }

H01F 1/01 . of inorganic materials (H01F 1/44 takes precedence)

H01F 1/012 .. { adapted for magnetic entropy change by magnetocaloric effect, e.g. used as magnetic refrigerating material (refrigeration systems using magnetic effects F25B 21/00) }

H01F 1/015 ... { Metals or alloys }

H01F 1/017 ... { Compounds }

H01F 1/03 .. characterised by their coercivity { (H01F 1/40 takes precedence) }

H01F 1/0302 ... { characterised by unspecified or heterogeneous hardness or specially adapted for magnetic hardness transitions }

H01F 1/0304 .... { adapted for large Barkhausen jumps or domain wall rotations, e.g. WIEGAND or MATTEUCCI effect (H01F 1/143 and H01F 1/15391 take precedence) }

H01F 1/0306 .... { Metals or alloys, e.g. LAVES phase alloys of the MgCu2-type (H01F 1/0304 takes precedence) }

H01F 1/0308 ..... { with magnetic shape memory (MSM), i.e. with lattice transformations driven by a magnetic field, e.g. Heusler alloys }

H01F 1/0311 .... { Compounds (H01F 1/0304 takes precedence) }

H01F 1/0313 ..... { Oxidic compounds }

H01F 1/0315 ..... { Ferrites }

H01F 1/0317 ..... { Manganites }

H01F 1/032 ... of hard-magnetic materials

H01F 1/04 .... Metals or alloys

H01F 1/047 ..... Alloys characterised by their composition

NOTE

In groups H01F 1/053 to H01F 1/059 , an alloy is classified in the last appropriate place

H01F 1/053 ..... containing rare earth metals

H01F 1/0533 ..... { in a bonding agent }

H01F 1/0536 ..... { sintered }

H01F 1/055 ..... and magnetic transition metals, e.g. SmCo5

H01F 1/0551 ..... { in the form of particles, e.g. rapid quenched powders or ribbon flakes }

H01F 1/0552 ..... { with a protective layer }

H01F 1/0553 ..... { obtained by reduction or by hydrogen decrepitation or embrittlement }

H01F 1/0555 ..... { pressed, sintered or bonded together }

H01F 1/0556 ..... { pressed }

H01F 1/0557 ..... { sintered }

H01F 1/0558 ..... { bonded together }

H01F 1/057 ..... and IIIa elements, e.g. Nd2Fe14B

H01F 1/0571 ..... { in the form of particles, e.g. rapid quenched powders or ribbon flakes }

H01F 1/0572 ..... { with a protective layer }

H01F 1/0573 . . . . . { obtained by reduction or by hydrogen decrepitation or embrittlement }

H01F 1/0574 . . . . . { obtained by liquid dynamic compaction }

H01F 1/0575 . . . . . { pressed, sintered or bonded together }

H01F 1/0576 . . . . . { pressed, e.g. hot working }

H01F 1/0577 . . . . . { sintered }

H01F 1/0578 . . . . . { bonded together }

H01F 1/0579 . . . . . { with exchange spin coupling between hard and soft nanophases, e.g. nanocomposite spring magnets }

H01F 1/058 . . . . . and IVa elements, e.g. Gd2Fe14C

H01F 1/059 . . . . . and Va elements, e.g. Sm2Fe17N2

H01F 1/0593 . . . . . { of tetragonal ThMn12-structure }

H01F 1/0596 . . . . . { of rhombic or rhombohedral Th2Zn17 structure or hexagonal Th2Ni17 structure }

H01F 1/06 . . . . . in the form of particles, e.g. powder (H01F 1/047 takes precedence; { record carriers G11B 5/70605 })

H01F 1/061 . . . . . { with a protective layer }

H01F 1/063 . . . . . { with a non magnetic core }

H01F 1/065 . . . . . { obtained by a reduction }

H01F 1/066 . . . . . { obtained by liquid dynamic compaction }

H01F 1/068 . . . . . { having a L10 crystallographic structure, e.g. [Co,Fe } [Pt,Pd] (nano)particles]

WARNING

This groups is not complete pending the completion of reclassification; see provisionally also H01F 1/06 - H01F 1/06 E

H01F 1/08 . . . . . pressed, sintered, or bound together

H01F 1/083 . . . . . { in a bonding agent }

H01F 1/086 . . . . . { sintered }

H01F 1/09 . . . . Mixtures of metallic and non-metallic particles ; Metallic particles having oxide skin

H01F 1/10 . . . . Non-metallic substances, e.g. ferrites { e.g. [(Ba,Sr)O(Fe2O3)6 } ferrites with hexagonal structure]

H01F 1/11 . . . . . in the form of particles { (for magnetic record carriers G11B 5/70626) }

H01F 1/111 . . . . . { with a non-magnetic core }

H01F 1/112 . . . . . { with a skin (H01F 1/113 takes precedence) }

H01F 1/113 . . . . . in a bonding agent

H01F 1/117 . . . . . Flexible bodies

H01F 1/12 . . . of soft-magnetic materials

H01F 1/14 . . . . Metals or alloys

H01F 1/143 . . . . . { in the form of wires (H01F 1/147 takes precedence) }

H01F 1/147 . . . . . Alloys characterised by their composition { (treatment thereof for enhancing their electromagnetic properties C21D 8/12) }

NOTE

In groups H01F 1/14708 to H01F 1/15391 , an alloy is classified in the last appropriate place

H01F 1/14708	.....	{ Fe-Ni based alloys (pure Fe or Ni H01F 1/14 , H01F 1/16 or H01F 1/20) }
H01F 1/14716	.....	{ in the form of sheets }
H01F 1/14725	.....	{ with insulating coating }
H01F 1/14733	.....	{ in the form of particles }
H01F 1/14741	.....	{ pressed, sintered or bonded together }
H01F 1/1475	.....	{ the particles being insulated }
H01F 1/14758	.....	{ by macromolecular organic substances }
H01F 1/14766	.....	{ Fe-Si based alloys }
H01F 1/14775	.....	{ in the form of sheets }
H01F 1/14783	.....	{ with insulating coating }
H01F 1/14791	.....	{ Fe-Si-Al based alloys, e.g. Sendust }
H01F 1/153	.....	Amorphous metallic alloys, e.g. glassy metals { (making ferrous amorphous alloys C22C 33/003) }
H01F 1/15308	.....	{ based on Fe/Ni (H01F 1/15325 takes precedence) }
H01F 1/15316	.....	{ based on Co (H01F 1/15325 takes precedence) }
H01F 1/15325	.....	{ containing rare earths }
H01F 1/15333	.....	{ containing nanocrystallites, e.g. obtained by annealing }
H01F 1/15341	.....	{ Preparation processes therefor }
H01F 1/1535	.....	{ by powder metallurgy, e.g. spark erosion }
H01F 1/15358	.....	{ Making agglomerates therefrom, e.g. by pressing }
H01F 1/15366	.....	{ using a binder }
H01F 1/15375	.....	{ using polymers }
H01F 1/15383	.....	{ Applying coatings thereon (H01F 1/15366 takes precedence) }
H01F 1/15391	.....	{ Elongated structures, e.g. wires }
H01F 1/16	.....	in the form of sheets (H01F 1/147 takes precedence)
H01F 1/18	.....	with insulating coating
H01F 1/20	.....	in the form of particles, e.g. powder (H01F 1/147 takes precedence)
H01F 1/22	.....	pressed, sintered, or bound together
H01F 1/24	.....	the particles being insulated
H01F 1/26	.....	by macromolecular organic substances
H01F 1/28	.....	dispersed or suspended in a bonding agent
H01F 1/33	....	Mixtures of metallic and non-metallic particles ; Metallic particles having oxide skin
H01F 1/34	....	Non-metallic substances, e.g. ferrites
H01F 1/342	.....	{ Oxides (H01F 1/36 and H01F 1/38 take precedence) }
H01F 1/344	.....	{ Ferrites, e.g. having a cubic spinel structure (X2+O)(Y23+O3); e.g. magnetite Fe3O4 }
H01F 1/346	.....	{ Garnets, e.g. having a cubic nesosilicates-based structure

[X2+3Y3+2 } [(TO4) 3] with T= Si, Al, Fe, Ga (H01F 10/24 takes precedence; Faraday rotators G02F 1/09)]

H01F 1/348 . . . . . { Hexaferrites with decreased hardness or anisotropy, i.e. with increased permeability in the microwave (GHz) range, e.g. having a hexagonal crystallographic structure }

H01F 1/36 . . . . . in the form of particles { (H01F 1/346 , H01F 1/348 and H01F 1/38 take precedence) }

H01F 1/37 . . . . . in a bonding agent

H01F 1/375 . . . . . Flexible bodies

H01F 1/38 . . . . . amorphous, e.g. amorphous oxides

H01F 1/40 . . of magnetic semiconductor materials, e.g. CdCr2S4 (devices using galvano-magnetic or similar effects H01L 43/00)

H01F 1/401 . . . { diluted }

NOTE

In group H01F 1/401 , a diluted magnetic semiconductor (DMS) is classified in the last appropriate place

H01F 1/402 . . . . { of II-VI type, e.g. Zn1-x Crx Se }

H01F 1/404 . . . . { of III-V type, e.g. In1-x Mnx As }

H01F 1/405 . . . . { of IV type, e.g. Ge1-xMnx }

H01F 1/407 . . . . { Diluted non-magnetic ions in a magnetic cation-sublattice, e.g. perovskites, La1-x(Ba,Sr)xMnO3 }

H01F 1/408 . . . { half-metallic, i.e. having only one electronic spin direction at the Fermi level, e.g. CrO2, Heusler alloys (H01F 10/1936 takes precedence) }

H01F 1/42 . of organic or organo-metallic materials, { e.g. graphene } (H01F 1/44 akes precedence)

H01F 1/44 . of magnetic liquids, e.g. ferrofluids (particles in a bonding agent H01F 1/28 , H01F 1/36 , { H01F 1/37 })

H01F 1/442 . . { the magnetic component being a metal or alloy, e.g. Fe (H01F 1/447 takes precedence) }

H01F 1/445 . . { the magnetic component being a compound, e.g. Fe3O4 (H01F 1/447 takes precedence) }

H01F 1/447 . . { characterised by magnetoviscosity, e.g. magnetorheological, magnetothixotropic, magnetodilatant liquids (electrorheological fluids C10M 171/001) }

H01F 3/00 **Cores, Yokes, or armatures** (magnetic materials H01F 1/00 ; permanent magnets H01F 7/02)

H01F 3/02 . made from sheets

H01F 3/04 . made from strips or ribbons

H01F 3/06 . made from wires

H01F 3/08 . made from powder (powder coatings on sheets H01F 3/02 ; on strips or ribbons H01F 3/04 ; on wires H01F 3/06)

H01F 3/10 . Composite arrangements of magnetic circuits

H01F 3/12 . . Magnetic shunt paths

H01F 3/14 . . Constrictions ; Gaps, e.g. air-gaps (in magnetic shunt paths H01F 3/12)

H01F 5/00 **Coils** (superconducting coils H01F 6/06 ; fixed inductances of the signal type H01F 17/00)

H01F 5/003 . { Printed circuit coils }

H01F 5/02 . wound on non-magnetic supports, e.g. formers

H01F 5/04 . Arrangements of electric connections to coils, e.g. leads

H01F 5/06 . Insulation of windings

H01F 6/00 **Superconducting magnets ; Superconducting coils** { (magnetic resonance assemblies using superconducting coil systems G01R 33/3815) }

H01F 6/003 . { Methods and means for discharging superconductive storage (superconducting alloys C22C ; static memories with superconducting elements G11C 11/44 ; superconducting circuit breakers with contacts H01H 33/004 ; superconducting material H01L 39/00 ; power cryotons H01L 39/20 ; superconducting switches for low power H03K 17/92) }

H01F 6/005 . { Methods and means for increasing the stored energy in superconductive coils by increments (flux pumps) }

H01F 6/006 . { Supplying energising or de-energising current; Flux pumps }

H01F 6/008 . . { Electric circuit arrangements for energising superconductive electromagnets }

H01F 6/02 . Quenching ; Protection arrangements during quenching { (protection circuits H02H 7/001) }

H01F 6/04 . Cooling

H01F 6/06 . Coils, e.g. winding, insulating, terminating or casing arrangements therefor

H01F 6/065 . . { Feed-through bushings, terminals and joints (leading of conductors or axles through casings of transformers H01F 27/04) }

H01F 7/00 **Magnets** (superconducting magnets H01F 6/00 ; for separation of solid materials or fluids B03C 1/00 ; for bench or like work-holders B23B 31/28 , B23Q 3/00 ; work-holding devices B25B 11/00 ; lifting magnets B66C 1/00 ; { operating or controlling locks using permanent magnets E05B 47/0038 ; devices for holding a wing, e.g. door or window, by magnetic or electromagnetic attraction E05C 19/16 ; relieving load or bearings using magnetic means F16C 39/06 } ; for electric meters G01R ; for relays H01H ; { for electric discharge tubes H01J , e.g. H01J 3/24 , H01J 23/10 , H01J 29/68 } ; for dynamo-electric machines H02K)

H01F 7/02 . Permanent magnets { (PM) }

H01F 7/0205 . . { Magnetic circuits with PM in general }

H01F 7/021 . . . { Construction of PM (H01F 7/0278 takes precedence; PM compositions H01F 1/032) }

H01F 7/0215 . . . . { Flexible forms, sheets }

H01F 7/0221 . . . { Mounting means for PM, supporting, coating, encapsulating PM }

H01F 7/0226 . . . { PM with variable field strength (H01F 7/0284 takes precedence) }

H01F 7/0231 . . { Magnetic circuits with PM for power or force generation }

H01F 7/0236 . . . { Magnetic suspension or levitation (for vehicles B60L 13/04 ; magnetic bearings F16C 39/063) }

H01F 7/0242 . . . { Magnetic drives, magnetic coupling devices }

H01F 7/0247 . . . { Orientating, locating, transporting arrangements }

H01F 7/0252 . . . { PM holding devices (H01F 7/021 , H01F 7/0215 , H01F 7/0226 take precedence) }

H01F 7/0257 . . . . { Lifting, pick-up magnetic objects }

H01F 7/0263 . . . . { Closures, bags, bands, engagement devices with male and female parts }

H01F 7/0268 . . . . { Magnetic cylinders }

H01F 7/0273 . . { Magnetic circuits with PM for magnetic field generation }

H01F 7/0278 . . . { for generating uniform fields, focusing, deflecting electrically charged particles (for magnetic separation by Lorentz force B03C 1/023 ; specially adapted for NMR applications G01R 33/383) }

H01F 7/0284 . . . . { using a trimmable or adjustable magnetic circuit, e.g. for a symmetric dipole or quadrupole magnetic field }

H01F 7/0289 . . . { Transducers, loudspeakers, moving coil arrangements }

H01F 7/0294 . . . { Detection, inspection, magnetic treatment }

H01F 7/04 . . Means for releasing the attractive force

H01F 7/06 . Electromagnets ; Actuators including electromagnets { (electric coils H01F 5/00 ; devices for holding workpieces using electric force B23Q 3/15 ; load-engaging elements for lifting articles electromagnetically B66C 1/06 ; electromagnetic couplings F16D 27/00 ; magnetic brakes F16D 63/002 ; electromagnetically operated valves F16K 11/24 , F16K 31/00 ; magnetically locked mine lamps F21L 11/00 ; analysing materials by magnetic means G01N 27/72 , G01N 27/80 to G01N 27/88 ; electromagnets for winding mechanical clocks G04C 1/02 ; electromagnetic relays H01H 51/00 ; windings for salient poles of dynamo-electric machines H02K 3/18 ; electromagnets for telegraphic communication H04L ; for arc lamps H05B 31/28) }

H01F 7/064 . . { Circuit arrangements for actuating electromagnets (circuit arrangements for obtaining special operating characteristics H01F 7/18 ; driving circuits for electromagnets making use of a switching regulator H01H 47/325) }

H01F 7/066 . . { Electromagnets with movable winding }

H01F 7/08 . . with armatures

H01F 7/081 . . . { Magnetic constructions }

H01F 7/088 . . . { provided with means for absorbing shocks }

H01F 7/10 . . . specially adapted for alternating current

H01F 7/11 . . . . reducing or eliminating the effects of eddy currents

H01F 7/12 . . . . having anti-chattering arrangements

H01F 7/1205 . . . . . { having short-circuited conductors (electromagnetic relays provided with short-circuited conducting sleeves H01H 47/00) }

H01F 7/121 . . . Guiding or setting position of armatures, e.g. retaining armatures in their end position

H01F 7/122 .... by permanent magnets { (H01F 7/1615 , H01F 7/1646 take precedence) }

H01F 7/123 .... by ancillary coil

H01F 7/124 .... by mechanical latch, e.g. detent

H01F 7/126 ... Supporting or mounting

H01F 7/127 ... Assembling

H01F 7/128 ... Encapsulating, encasing or sealing

H01F 7/129 .... of armatures

H01F 7/13 ... characterised by pulling-force characteristics

H01F 7/14 ... Pivoting armatures (H01F 7/17 takes precedence)

H01F 7/145 .... { Rotary electromagnets with variable gap (with fixed gap or torque motors H02K 26/00) }

H01F 7/16 ... Rectilinearly-movable armatures (H01F 7/17 takes precedence)

H01F 7/1607 .... { Armatures entering the winding }

H01F 7/1615 ..... { Armatures or stationary parts of magnetic circuit having permanent magnet }

H01F 7/1623 ..... { Armatures having T-form }

H01F 7/1638 .... { Armatures not entering the winding }

H01F 7/1646 ..... { Armatures or stationary parts of magnetic circuit having permanent magnet }

H01F 7/1653 .... { Magnetic circuit having axially spaced pole-pieces }

H01F 7/17 ... Pivoting and rectilinearly-movable armatures

H01F 7/18 ... Circuit arrangements for obtaining desired operating characteristics, e.g. for slow operation, for sequential energisation of windings, for high-speed energisation of windings

H01F 7/1805 .... { Circuit arrangements for holding the operation of electromagnets or for holding the armature in attracted position with reduced energising current (for holding relay armature in attracted position with reduced energising current H01H 47/04 ; quick energising of electro-dynamic machines H02P 9/08 ; for quickly de-energising of dynamo-electric generators H02P 9/123) }

H01F 7/1811 ..... { demagnetising upon switching off, removing residual magnetism }

H01F 7/1816 ..... { making use of an energy accumulator (for relays H01H 47/043) }

H01F 7/1827 ..... { by changing number of serially-connected turns or windings (for relays H01H 47/06) }

H01F 7/1833 ..... { by changing number of parallel-connected turns or windings (for relays H01H 47/08) }

H01F 7/1838 ..... { by switching-in or -out impedance (for relays H01H 47/10) }

H01F 7/1844 .... { Monitoring or fail-safe circuits (for relays H01H 47/002) }

H01F 7/1872 .... { Bistable or bidirectional current devices (relays H01H 47/226) }

H01F 7/1877 .... { controlling a plurality of loads }

H01F 7/1883 .... { by steepening leading and trailing edges of magnetisation pulse, e.g. printer drivers }

H01F 7/20 .. without armatures (cores H01F 3/00 ; coils H01F 5/00 ; { shaping metal by applying magnetic forces B21D 26/14 ; analysing methods using magnetic fields G01N 24/06 ; electromagnets specially adapted for NMR applications G01R 33/381 })

H01F 7/202 ... { Electromagnets for high magnetic field strength (for superconducting

electromagnets H01F 6/00 ; for transformers or inductances without a magnetic core H01F 30/08) }

H01F 7/204 . . . . { Circuits for energising or de-energising }

H01F 7/206 . . . { Electromagnets for lifting, handling or transporting of magnetic pieces or material (electromagnets for guidance of vehicles, workpieces B61B 31/08 , B65G 21/2009 ; for magnetic suspension or levitation H02N 15/00) }

H01F 10/00 **Thin magnetic films, e.g. of one-domain structure** (magnetic record carriers G11B 5/00 ; thin-film magnetic stores G11C)

H01F 10/002 . { Antiferromagnetic thin films, i.e. films exhibiting a Néel transition temperature (H01F 10/3218 and H01F 10/3268 take precedence) }

WARNING

This groups is not complete pending the completion of reclassification; see provisionally also H01F 10/00 - H01F 10/30

H01F 10/005 . { organic or organo-metallic films, e.g. monomolecular films obtained by Langmuir-Blodgett technique, graphene }

H01F 10/007 . { ultrathin or granular films (H01F 10/005 and H01F 10/3227 take precedence; applying ultrathin or granular layers to substrates H01F 41/301) }

H01F 10/06 . characterised by the coupling or physical contact with connecting or interacting conductors

H01F 10/08 . characterised by magnetic layers ({ H01F 10/32 takes precedence } ; applying thin magnetic films to substrates H01F 41/14)

H01F 10/10 . . characterised by the composition

H01F 10/12 . . . being metal or alloys (intermetallic compounds H01F 10/18)

H01F 10/123 . . . . { having a L10 crystallographic structure, e.g. [Co,Fe } [Pt,Pd] thin films]

WARNING

This groups is not complete pending the completion of reclassification; see provisionally also H01F 10/16

H01F 10/126 . . . . { containing rare earth metals (H01F 10/133 takes precedence) }

H01F 10/13 . . . . Amorphous metallic alloys, e.g. glassy metals { (H01F 10/3204 takes precedence) }

NOTE

In this group, amorphous metallic alloys are classified in the last appropriate place

H01F 10/131 . . . . . { containing iron or nickel }

H01F 10/132 . . . . . { containing cobalt }

H01F 10/133 . . . . . { containing rare earth metals }

H01F 10/135 . . . . . { containing transition metals }

H01F 10/136 ..... { containing iron }

H01F 10/137 ..... { containing cobalt }

H01F 10/138 ..... { containing nanocrystallites, e.g. obtained by annealing }

H01F 10/14 .... containing iron or nickel ({ H01F 10/126 } , H01F 10/13 , H01F 10/16 take precedence)

NOTE

In this group, alloys containing iron or nickel are classified in the last appropriate place

H01F 10/142 ..... { containing Si }

H01F 10/145 ..... { containing Al, e.g. SENDUST }

H01F 10/147 ..... { with lattice under strain, e.g. expanded by interstitial nitrogen (H01F 10/26 to H01F 10/30 take precedence) }

H01F 10/16 .... containing cobalt ({ H01F 10/126 } , H01F 10/13 take precedence)

H01F 10/18 ... being compounds

H01F 10/187 .... Amorphous compounds { (H01F 10/3204 takes precedence) }

H01F 10/193 .... Magnetic semiconductor compounds { (in general H01F 1/40 ; multilayers, e.g. superlattices H01F 10/3213) }

H01F 10/1933 ..... { Perovskites }

WARNING

This groups is not complete pending the completion of reclassification; see provisionally also H01F 10/193

H01F 10/1936 ..... { Half-metallic, e.g. epitaxial CrO2 or NiMnSb films }

H01F 10/20 .... Ferrites

H01F 10/205 ..... { Hexagonal ferrites }

H01F 10/22 ..... Orthoferrites { e.g. RFeO3 (R= rare earth element) with orthorhombic structure }

H01F 10/24 ..... Garnets { (in general H01F 1/346 ; multilayers, e.g. superlattices H01F 10/3209 ; applying magnetic garnet films to substrates by sputtering H01F 41/186) }

H01F 10/245 ..... { Modifications for enhancing interaction with electromagnetic wave energy }

H01F 10/26 . characterised by the substrate or intermediate layers { (H01F 10/06 and H01F 10/32 take precedence) }

H01F 10/265 .. { Magnetic multilayers non exchange-coupled (H01F 10/32 takes precedence) }

WARNING

This groups is not complete pending the completion of reclassification; see provisionally also H01F 10/00 - H01F 10/30

H01F 10/28 .. characterised by the composition of the substrate

H01F 10/30 .. characterised by the composition of the intermediate layers { e.g. seed, buffer, template, diffusion preventing, cap layers (H01F 10/06 and H01F 10/32 take precedence) }

H01F 10/32 . Spin-exchange-coupled multilayers, e.g. nanostructured superlattices { (applying spin-exchange-coupled multilayers to substrates H01F 41/302) }

H01F 10/3204 .. { Exchange coupling of amorphous multilayers }

H01F 10/3209 .. { Exchange coupling of garnet multilayers }

H01F 10/3213 .. { Exchange coupling of magnetic semiconductor multilayers, e.g. MnSe/ZnSe superlattices (semiconductor materials for use in semiconductor devices H01L 29/12) }

H01F 10/3218 .. { Exchange coupling of magnetic films via an antiferromagnetic interface (H01F 10/3268 takes precedence) }

H01F 10/3222 .. { Exchange coupled hard/soft multilayers, e.g. CoPt/Co or NiFe/CoSm (nanocomposite spring magnets H01F 1/0579) }

H01F 10/3227 .. { Exchange coupling via one or more magnetisable ultrathin or granular films }

H01F 10/3231 ... { via a non-magnetic spacer }

H01F 10/3236 .... { made of a noble metal, e.g. (Co/Pt) n multilayers having perpendicular anisotropy (H01F 10/3286 takes precedence) }

H01F 10/324 .. { Exchange coupling of magnetic film pairs via a very thin non-magnetic spacer, e.g. by exchange with conduction electrons of the spacer }

H01F 10/3245 ... { the spacer being superconductive }

H01F 10/325 ... { the spacer being noble metal }

H01F 10/3254 ... { the spacer being semiconducting or insulating, e.g. for spin tunnel junction (STJ) }

H01F 10/3259 .... { Spin-exchange-coupled multilayers comprising at least a nano-oxide layer (NOL), e.g. with a NOL spacer }

H01F 10/3263 ... { the exchange coupling being symmetric, e.g. for dual spin valve, e.g. NiO/Co/Cu/Co/Cu/Co/NiO }

H01F 10/3268 ... { the exchange coupling being asymmetric, e.g. by use of additional pinning, by using antiferromagnetic or ferromagnetic coupling interface, i.e. so-called spin-valve (SV) structure, e.g. NiFe/Cu/NiFe/FeMn }

H01F 10/3272 .... { by use of anti-parallel coupled (APC) ferromagnetic layers, e.g. artificial ferrimagnets (AFI), artificial (AAF) or synthetic (SAF) anti-ferromagnets }

H01F 10/3277 ..... { by use of artificial ferrimagnets (AFI) only }

H01F 10/3281 .... { only by use of asymmetry of the magnetic film pair itself, i.e. so-called pseudospin valve (PSV) structure, e.g. NiFe/Cu/Co }

H01F 10/3286 ... { Spin-exchange coupled multilayers having at least one layer with perpendicular magnetic anisotropy }

H01F 10/329 ... { Spin-exchange coupled multilayers wherein the magnetisation of the free layer is switched by a spin-polarised current, e.g. spin torque effect }

H01F 10/3295 ... { Spin-exchange coupled multilayers wherein the magnetic pinned or free layers are laminated without anti-parallel coupling within the pinned and free layers }

H01F 13/00 **Apparatus or processes for magnetising or demagnetising** ({ devices for holding workpieces using magnetic or electric force acting directly on the workpieces B23Q 3/15 } ; for degaussing ships B63G 9/06 ; for clocks or watches G04D 9/00 ; { recording or erasing of information on magnetic record carriers G11B 5/00 } ; demagnetising arrangements for colour television H04N 9/29)

H01F 13/003 . { Methods and devices for magnetising permanent magnets (permanent magnets H01F 7/02) }

H01F 13/006 . { Methods and devices for demagnetising of magnetic bodies, e.g. workpieces, sheet material (for erasing of information on magnetic record carriers G11B 5/00) }

H01F 17/00 **Fixed inductances of the signal type** (coils in general H01F 5/00 { inductors without a potential-jump or surface barrier specially adapted for integrated circuits, details thereof and multistep manufacturing processes therefor H01L 28/10 })

H01F 17/0006 . { Printed inductances (printed coils for dynamo-electric machines H02K 3/26 ; printed circuits H05K) }

H01F 17/0013 . . { with stacked layers (H01F 27/2804 takes precedence) }

H01F 17/0033 . . { with the coil helically wound around a magnetic core }

H01F 17/02 . without magnetic core

H01F 17/03 . . with ceramic former

H01F 17/04 . with magnetic core

H01F 17/041 . . { Means for preventing rotation or displacement of the core }

H01F 17/043 . . { with two, usually identical or nearly identical parts enclosing completely the coil (pot cores) }

H01F 17/045 . . { with core of cylindric geometry and coil wound along its longitudinal axis, i.e. rod or drum core }

H01F 17/06 . . with core substantially closed in itself, e.g. toroid

H01F 17/062 . . . { Toroidal core with turns of coil around it }

H01F 17/08 . . . Loading coils for telecommunication circuits

H01F 19/00 **Fixed transformers or mutual inductances of the signal type** (H01F 36/00 takes precedence)

H01F 19/02 . Audio-frequency transformers or mutual inductances, i.e. not suitable for handling frequencies considerably beyond the audio range

H01F 19/04 . Transformers or mutual inductances suitable for handling frequencies considerably beyond the audio range (resonant circuits H03H)

H01F 19/06 . . Broad-band transformers, e.g. suitable for handling frequencies well down into the audio range

H01F 19/08 . . Transformers having magnetic bias, e.g. for handling pulses

H01F 21/00 **Variable inductances or transformers of the signal type** (H01F 36/00 takes precedence)

H01F 21/005 . { Inductances without magnetic core }

H01F 21/02 . continuously variable, e.g. variometers

H01F 21/04 . . by relative movement of turns or parts of windings

H01F 21/06 . . by movement of core or part of core relative to the windings as a whole

H01F 21/065 . . . { Measures for obtaining a desired relation between the position of the core and the inductance }

H01F 21/08 . . by varying the permeability of the core, e.g. by varying magnetic bias

H01F 21/10 . . by means of a movable shield

H01F 21/12 . discontinuously variable, e.g. tapped

H01F 27/00 Details of transformers or inductances, in general

H01F 27/002 . { Arrangements provided on the transformer facilitating its transport }

H01F 27/004 . { Arrangements for interchanging inductances, transformers or coils thereof }

H01F 27/006 . { with special arrangement or spacing of turns of the winding(s), e.g. to produce desired self-resonance }

H01F 27/008 . { with temperature compensation }

H01F 27/02 . Casings

H01F 27/022 . . { Encapsulation }

H01F 27/025 . . { Constructional details relating to cooling }

H01F 27/027 . . { specially adapted for combination of signal type inductors or transformers with electronic circuits, e.g. mounting on printed circuit boards }

H01F 27/04 . . Leading of conductors or axles through casings, e.g. for tap-changing arrangements

H01F 27/06 . Mounting, supporting or suspending transformers, reactors or choke coils { not being of the signal type }

H01F 27/08 . Cooling (heat-transfer elements F28F) ; Ventilating (structural details of casings H01F 27/02)

H01F 27/085 . . { Cooling by ambient air }

H01F 27/10 . . Liquid cooling

H01F 27/105 . . . { Cooling by special liquid or by liquid of particular composition }

H01F 27/12 . . . Oil cooling

H01F 27/125 . . . . { Cooling by synthetic insulating and incombustible liquid }

H01F 27/14 . . . . Expansion chambers ; Oil conservators ; Gas cushions ; Arrangements for purifying, drying, or filling

H01F 27/16 . . . Water cooling

H01F 27/18 . . . by evaporating liquids

H01F 27/20 . . Cooling by special gases or non-ambient air

H01F 27/22 . . Cooling by heat conduction through solid or powdered fillings

H01F 27/23 . Corrosion protection

H01F 27/24 . Magnetic cores

H01F 27/245 . . made from sheets, e.g. grain-oriented (H01F 27/26 takes precedence)

H01F 27/2455 . . . { using bent laminations }

H01F 27/25 . . made from strips or ribbons (H01F 27/26 takes precedence)

H01F 27/255 . . made from particles (H01F 27/26 takes precedence)

H01F 27/26 . . Fastening parts of the core together ; Fastening or mounting the core on casing or support (on coil H01F 27/30)

H01F 27/263 . . . { Fastening parts of the core together }

H01F 27/266 . . . { Fastening or mounting the core on casing or support (on coil H01F 27/30) }

H01F 27/28 . Coils ; Windings ; Conductive connections

H01F 27/2804 . . { Printed windings }

H01F 27/2823 . . { Wires (H01F 27/2866 takes precedence) }

H01F 27/2828 . . . { Construction of conductive connections, of leads }

H01F 27/2847 . . { Sheets; Strips (H01F 27/2866 takes precedence) }

H01F 27/2852 . . . { Construction of conductive connections, of leads }

H01F 27/2866 . . { Combination of wires and sheets }

H01F 27/2871 . . { Pancake coils }

H01F 27/2876 . . { Cooling (cooling transformers and inductances in general H01F 27/08) }

H01F 27/288 . . { Shielding }

H01F 27/2885 . . . { with shields or electrodes (shields or electrodes for pancake coils H01F 27/2871 ; construction of electric or magnetic shields or screens H01F 27/36) }

H01F 27/289 . . . { with auxiliary windings (for pancake coils H01F 27/2871) }

H01F 27/2895 . . { Windings disposed upon ring cores }

H01F 27/29 . . Terminals ; Tapping arrangements { for signal inductances }

H01F 27/292 . . . { Surface mounted devices }

H01F 27/30 . . Fastening or clamping coils, windings, or parts thereof together ; Fastening or mounting coils or windings on core, casing, or other support

H01F 27/303 . . . { Clamping coils, windings or parts thereof together }

H01F 27/306 . . . { Fastening or mounting coils or windings on core, casing or other support }

H01F 27/32 . . Insulating of coils, windings, or parts thereof

H01F 27/321 . . . { using a fluid for insulating purposes only }

H01F 27/322 . . . { the insulation forming channels for circulation of the fluid }

H01F 27/323 . . . { Insulation between winding turns, between winding layers }

H01F 27/324 . . . { Insulation between coil and core, between different winding sections, around the coil; Other insulation structures }

H01F 27/325 . . . . { Coil bobbins (formers for coils in general H01F 5/02) }

H01F 27/326 . . . . { specifically adapted for discharge lamp ballasts }

H01F 27/327 . . . { Encapsulating or impregnating (encapsulating coil and core H01F 27/022) }

H01F 27/33 . Arrangements for noise damping

H01F 27/34 . Special means for preventing or reducing unwanted electric or magnetic effects, e.g. no-load losses, reactive currents, harmonics, oscillations, leakage fields

H01F 27/341 . . { Preventing or reducing no-load losses or reactive currents }

H01F 27/343 . . { Preventing or reducing surge voltages; oscillations }

H01F 27/345 . . . { using auxiliary conductors }

H01F 27/346 . . { Preventing or reducing leakage fields (using magnetic shields H01F 27/365 ;

using auxiliary windings H01F 27/38) }

H01F 27/36 . . Electric or magnetic shields or screens (movable for varying inductance H01F 21/10)

H01F 27/362 . . . { Electric shields or screens }

H01F 27/365 . . . { Magnetic shields or screens }

H01F 27/367 . . . . { using non-magnetic screens }

H01F 27/38 . . Auxiliary core members ; Auxiliary coils or windings

H01F 27/385 . . . { for reducing harmonics }

H01F 27/40 . Structural association with built-in electric component, e.g. fuse

H01F 27/402 . . { Association of measuring or protective means }

H01F 27/42 . Circuits specially adapted for the purpose of modifying, or compensating for, electric characteristics of transformers, reactors, or choke coils (circuits for controlling transformers, reactors or choke coils, for the purpose of obtaining a desired output H02P 13/00 ; impedance networks H03H)

H01F 27/422 . . { for instrument transformers }

H01F 27/425 . . . { for voltage transformers }

H01F 27/427 . . . { for current transformers }

H01F 29/00 **Variable transformers or inductances not covered by group H01F 21/00** { (tap change devices H01H 9/0005) }

H01F 29/02 . with tappings on coil or winding ; with provision for rearrangement or interconnection of windings

H01F 29/025 . . { Constructional details of transformers or reactors with tapping on coil or windings }

H01F 29/04 . . having provision for tap-changing without interrupting the load current

H01F 29/06 . with current collector gliding or rolling on or along winding

H01F 29/08 . with core, coil, winding, or shield movable to offset variation of voltage or phase shift, e.g. induction regulators

H01F 29/10 . . having movable part of magnetic circuit { (high leakage transformers H01F 38/08 ; dynamo-electric machines with movable part of magnetic circuit H02K 23/44 , H02K 23/48) }

H01F 29/12 . . having movable coil, winding, or part thereof ; having movable shield

H01F 29/14 . with variable magnetic bias ({ amplitude modulation by means of variable impedance element H03C 1/08 } ; magnetic amplifiers H03F ; { circuits for automatic telephonic communication H04M 3/00 })

H01F 29/146 . . { Constructional details }

H01F 30/00 **Fixed transformers not covered by group H01F 19/00**

H01F 30/02 . Auto-transformers

H01F 30/04 . having two or more secondary windings, each supplying a separate load, e.g. for radio set power supplies

H01F 30/06 . characterised by the structure
H01F 30/08 . . without magnetic core
H01F 30/10 . . Single-phase transformers (H01F 30/16 takes precedence)
H01F 30/12 . . Two-phase, three-phase or polyphase transformers
H01F 30/14 . . . for changing the number of phases
H01F 30/16 . . Toroidal transformers

H01F 36/00 **Transformers with superconductive windings or with windings operating at cryogenic temperature** (superconducting magnets or superconducting coils H01F 6/00)

H01F 37/00 **Fixed inductances not covered by group H01F 17/00**

H01F 37/005 . { without magnetic core }

H01F 38/00 **Adaptations of transformers or inductances for specific applications or functions**

H01F 38/02 . for non-linear operation
H01F 38/023 . . { of inductances }
H01F 38/04 . . for frequency changing
H01F 38/06 . . for changing the wave shape

H01F 38/08 . High-leakage transformers or inductances
H01F 38/085 . . { Welding transformers }
H01F 38/10 . . Ballasts, e.g. for discharge lamps

H01F 38/12 . Ignition, e.g. for IC engines

H01F 38/14 . Inductive couplings { (for charging batteries from ac mains by converters H02J 7/025) }

H01F 38/16 . Cascade transformers, e.g. for use with extra high tension

H01F 38/18 . Rotary transformers

H01F 38/20 . Instruments transformers
H01F 38/22 . . for single phase ac
H01F 38/24 . . . Voltage transformers
H01F 38/26 . . . . Constructions
H01F 38/28 . . . Current transformers
H01F 38/30 . . . . Constructions
H01F 38/32 . . . . Circuit arrangements
H01F 38/34 . . . Combined voltage and current transformers
H01F 38/36 . . . . Constructions
H01F 38/38 . . for polyphase ac

H01F 38/40 . . for dc

H01F 38/42 . Flyback transformers

H01F 41/00 Apparatus or processes specially adapted for manufacturing or assembling the devices covered by this subclass

H01F 41/005 . { Impregnating or encapsulating (insulating of windings H01F 41/12) }

H01F 41/02 . for manufacturing cores, coils, or magnets (H01F 41/14 takes precedence; for dynamo-electric machines H02K 15/00)

H01F 41/0206 . . { Manufacturing of magnetic cores by mechanical means (magnetic cores per se H01F 27/24) }

H01F 41/0213 . . . { Manufacturing of magnetic circuits made from strip(s) or ribbon(s) (magnetic cores made by winding a ribbon H01F 27/25) }

H01F 41/022 . . . . { by winding the strips or ribbons around a coil }

H01F 41/0226 . . . . { from amorphous ribbons }

H01F 41/0233 . . . { Manufacturing of magnetic circuits made from sheets (magnetic cores made from sheets H01F 27/245 ; soft magnetic alloys in the form of sheets H01F 1/16) }

H01F 41/024 . . . . { Manufacturing of magnetic circuits made from deformed sheets (magnetic cores made from deformed sheets H01F 27/2455) }

H01F 41/0246 . . . { Manufacturing of magnetic circuits by moulding or by pressing powder (magnetic cores made by moulding or by pressing powder H01F 27/255 ; soft magnetic particles H01F 1/20 , H01F 1/36) }

H01F 41/0253 . . { for manufacturing permanent magnets }

H01F 41/026 . . . { protecting methods against environmental influences, e.g. oxygen, by surface treatment (magnetic particles with skin H01F 1/061 , H01F 1/09 , H01F 1/24 , H01F 1/33 and G11B 5/706) }

H01F 41/0266 . . . { Moulding; Pressing (H01F 41/0273 takes precedence; hard magnetic particles H01F 1/06 , H01F 1/11) }

H01F 41/0273 . . . { Imparting anisotropy (methods and devices for magnetising permanent magnets H01F 13/003) }

H01F 41/028 . . . . { Radial anisotropy (for rotor or stator bodies H02K 15/02) }

H01F 41/0286 . . . { Trimming }

H01F 41/0293 . . . { diffusion of rare earth elements, e.g. Tb, Dy or Ho, into permanent magnets }

H01F 41/04 . . for manufacturing coils { (coils for transformer or inductances H01F 27/28) }

H01F 41/041 . . . { Printed circuit coils (apparatus or processes for manufacturing printed circuits in general H05K 3/00) }

H01F 41/042 . . . . { by thin film techniques }

H01F 41/043 . . . . { by thick film techniques }

H01F 41/045 . . . . { Trimming }

H01F 41/046 . . . . { structurally combined with ferromagnetic material }

H01F 41/047 . . . . { structurally combined with superconductive material }

H01F 41/048 . . . { Superconductive coils }

H01F 41/06 . . . Winding

H01F 41/0604 . . . . { Winding sheet material }

H01F 41/0608 . . . . . { with insulation }

H01F 41/0612 . . . . { Winding wire material }

H01F 41/0616 . . . . . { with insulation }

H01F 41/062 . . . . . { the insulation being strip material }

H01F 41/0625 . . . . . { Winding more than one wire }

H01F 41/0629 . . . . . { Twisting }

H01F 41/0633 . . . . { Devices for guiding or positioning the winding material on the winding form }

H01F 41/0637 . . . . . { forming pancake coils }

H01F 41/0641 . . . . . { positioning the winding material in a special configuration on the winding form (orthocyclic coils, open mesh coils) }

H01F 41/0645 . . . . . { using revolving flyers }

H01F 41/065 . . . . { Winding coils of special form }

H01F 41/0654 . . . . . { Winding on elongate winding forms }

H01F 41/0658 . . . . . { Winding flat coils }

H01F 41/0666 . . . . { Winding with terminal wrapping or soldering; Winding while forming taps or terminals }

H01F 41/067 . . . . { Winding machines having a plurality of work holders or winding forms }

H01F 41/0675 . . . . . { Turrets, turntables }

H01F 41/0679 . . . . { Tensioning or braking devices }

H01F 41/0683 . . . . { Dispensing or feeding devices }

H01F 41/0687 . . . . { Winding mandrels, winding forms }

H01F 41/0691 . . . . { Winding with deformation of the winding material section }

H01F 41/0695 . . . . { Winding while measuring electrical characteristics }

H01F 41/08 . . . . Winding conductors onto or threading conductors through cores or formers which are closed in themselves, e.g. toroids (for interconnecting digital storage elements G11C 5/12)

H01F 41/10 . . . Connecting leads to windings (making electric connections in general H01R 43/00)

H01F 41/12 . . . Insulating of windings ({ impregnating or encapsulating of transformers H01F 41/005 } ; of conductors in general H01B 13/06)

H01F 41/122 . . . . { Insulating between turns or between winding layers }

H01F 41/125 . . . . { Other insulating structures; Insulating between coil and core, between different winding sections, around the coil }

H01F 41/127 . . . . { Encapsulating or impregnating (encapsulating coil and core H01F 41/005) }

H01F 41/14 . for applying magnetic films to substrates (covering metals, or materials with metals, in general C23C ; manufacturing record carriers G11B 5/84)

NOTE

Group H01F 41/30 takes precedence over groups H01F 41/16 to H01F 41/24 , and over group H01F 41/32

H01F 41/16 . . the magnetic material being applied in the form of particles, e.g. by serigraphy { i.e. forming thick magnetic films and precursors therefor, e.g. magnetisable pastes, inks, glass frits (H01F 41/18 to H01F 41/24 take precedence; thick magnetic films

H01F 1/0027) }

H01F 41/18 . . by cathode sputtering

H01F 41/183 . . . { Sputtering targets therefor }

H01F 41/186 . . . { for applying a magnetic garnet film (magnetic garnet materials H01F 1/346 ; magnetic garnet films H01F 10/24) }

H01F 41/20 . . by evaporation

H01F 41/205 . . . { by laser ablation, e.g. pulsed laser deposition (PLD) }

H01F 41/22 . . Heat treatment ; Thermal decomposition ; Chemical vapour deposition

H01F 41/24 . . from liquids

H01F 41/26 . . . using electric currents { e.g. electroplating }

H01F 41/28 . . . by liquid phase epitaxy

H01F 41/30 . . for applying nanostructures, e.g. by molecular beam epitaxy (MBE)

H01F 41/301 . . . { for applying ultrathin or granular layers (ultrathin or granular layers H01F 10/007) }

H01F 41/302 . . . { for applying spin-exchange-coupled multilayers, e.g. nanostructured superlattices (spin-exchange-coupled multilayers H01F 10/32) }

H01F 41/303 . . . . { with exchange coupling adjustment of magnetic film pairs, e.g. interface modifications by reduction, oxidation }

H01F 41/304 . . . . . { using temporary decoupling, e.g. involving blocking, Néel or Curie temperature transitions by heat treatment in presence/absence of a magnetic field }

H01F 41/305 . . . . { applying the spacer or adjusting its interface, e.g. in order to enable particular effect different from exchange coupling }

H01F 41/306 . . . . . { conductive spacer }

H01F 41/307 . . . . . { insulating or semiconductive spacer }

H01F 41/308 . . . . { lift-off processes, e.g. ion milling, for trimming or patterning }

H01F 41/309 . . . . { electroless or electrodeposition processes from plating solution }

H01F 41/32 . for applying conductive, insulating or magnetic material on a magnetic film { , specially adapted for a thin magnetic film }

H01F 41/325 . . { applying a noble metal capping on a spin-exchange-coupled multilayer e.g. spin filter deposition }

WARNING

This groups is not complete pending the completion of reclassification; see provisionally also H01F 41/32

H01F 41/34 . . in patterns, e.g. by lithography

H01F 2003/00 **Cores, Yokes, or armatures** (magnetic materials H01F 1/00 ; permanent magnets H01F 7/02)

H01F 2003/005 . Magnetic cores for receiving several windings with perpendicular axes, e.g. for antennae or inductive power transfer

H01F 2003/10 . Composite arrangements of magnetic circuits

H01F 2003/103 . . Magnetic circuits with permanent magnets

H01F 2003/106 . . Magnetic circuits using combinations of different magnetic materials

H01F 2005/00 **Coils** (superconducting coils H01F 6/06 ; fixed inductances of the signal type H01F 17/00)

H01F 2005/006 . with conical spiral form

H01F 2005/02 . wound on non-magnetic supports, e.g. formers

H01F 2005/022 . . wound on formers with several winding chambers separated by flanges, e.g. for high voltage applications

H01F 2005/025 . . wound on coaxial arrangement of two or more formers

H01F 2005/027 . . wound on formers for receiving several coils with perpendicular winding axes, e.g. for antennae or inductive power transfer

H01F 2005/04 . Arrangements of electric connections to coils, e.g. leads

H01F 2005/043 . . having multiple pin terminals, e.g. arranged in two parallel lines at both sides of the coil

H01F 2005/046 . . Details of formers and pin terminals related to mounting on printed circuits

H01F 2006/00 **Superconducting magnets ; Superconducting coils** { (magnetic resonance assemblies using superconducting coil systems G01R 33/3815) }

H01F 2006/001 . Constructive details of inductive current limiters

H01F 2007/00 **Magnets** (superconducting magnets H01F 6/00 ; for separation of solid materials or fluids B03C 1/00 ; for bench or like work-holders B23B 31/28 , B23Q 3/00 ; work-holding devices B25B 11/00 ; lifting magnets B66C 1/00 ; { operating or controlling locks using permanent magnets E05B 47/0038 ; devices for holding a wing, e.g. door or window, by magnetic or electromagnetic attraction E05C 19/16 ; relieving load or bearings using magnetic means F16C 39/06 } ; for electric meters G01R ; for relays H01H ; { for electric discharge tubes H01J , e.g. H01J 3/24 , H01J 23/10 , H01J 29/68 } ; for dynamo-electric machines H02K)

H01F 2007/06 . Electromagnets ; Actuators including electromagnets { (electric coils H01F 5/00 ; devices for holding workpieces using electric force B23Q 3/15 ; load-engaging elements for lifting articles electromagnetically B66C 1/06 ; electromagnetic couplings F16D 27/00 ; magnetic brakes F16D 63/002 ; electromagnetically operated valves F16K 11/24 , F16K 31/00 ; magnetically locked mine lamps F21L 11/00 ; analysing materials by magnetic means G01N 27/72 , G01N 27/80 to G01N 27/88 ; electromagnets for winding mechanical clocks G04C 1/02 ; electromagnetic relays H01H 51/00 ; windings for salient poles of dynamo-electric machines H02K 3/18 ; electromagnets for telegraphic communication H04L ; for arc lamps H05B 31/28) }

H01F 2007/062 . . Details of terminals or connectors for electromagnets

H01F 2007/068 . . using printed circuit coils

H01F 2007/08 . . with armatures

H01F 2007/081 . . . { Magnetic constructions }

H01F 2007/083 . . . . External yoke surrounding the coil bobbin, e.g. made of bent magnetic sheet

H01F 2007/085 . . . . Yoke or polar piece between coil bobbin and armature having a gap, e.g. filled with nonmagnetic material

H01F 2007/086 . . . . Structural details of the armature

H01F 2007/16 . . . Rectilinearly-movable armatures (H01F 7/17 takes precedence)

H01F 2007/1607 . . . . { Armatures entering the winding }

H01F 2007/163 . . . . . with axial bearing

H01F 2007/1661 . . . . Electromagnets or actuators with anti-stick disc

H01F 2007/1669 . . . . Armatures actuated by current pulse, e.g. bistable actuators

H01F 2007/1676 . . . . Means for avoiding or reducing eddy currents in the magnetic circuit, e.g. radial slots

H01F 2007/1684 . . . . Armature position measurement using coils

H01F 2007/1692 . . . . Electromagnets or actuators with two coils

H01F 2007/18 . . . Circuit arrangements for obtaining desired operating characteristics, e.g. for slow operation, for sequential energisation of windings, for high-speed energisation of windings

H01F 2007/1805 . . . . { Circuit arrangements for holding the operation of electromagnets or for holding the armature in attracted position with reduced energising current (for holding relay armature in attracted position with reduced energising current H01H 47/04 ; quick energising of electro-dynamic machines H02P 9/08 ; for quickly de-energising of dynamo-electric generators H02P 9/123) }

H01F 2007/1816 . . . . . { making use of an energy accumulator (for relays H01H 47/043) }

H01F 2007/1822 . . . . . using a capacitor to produce a boost voltage

H01F 2007/1844 . . . . { Monitoring or fail-safe circuits (for relays H01H 47/002) }

H01F 2007/185 . . . . . with armature position measurement

H01F 2007/1855 . . . . . using a stored table to deduce one variable from another

H01F 2007/1861 . . . . . using derivative of measured variable

H01F 2007/1866 . . . . . with regulation loop

H01F 2007/1888 . . . . using pulse width modulation

H01F 2007/1894 . . . . minimizing impact energy on closure of magnetic circuit

H01F 2007/20 . . without armatures (cores H01F 3/00 ; coils H01F 5/00 ; { shaping metal by applying magnetic forces B21D 26/14 ; analysing methods using magnetic fields G01N 24/06 ; electromagnets specially adapted for NMR applications G01R 33/381 })

H01F 2007/206 . . . { Electromagnets for lifting, handling or transporting of magnetic pieces or material (electromagnets for guidance of vehicles, workpieces B61B 31/08 , B65G 21/2009 ; for magnetic suspension or levitation H02N 15/00) }

H01F 2007/208 . . . . combined with permanent magnets

H01F 2017/00 **Fixed inductances of the signal type** (coils in general H01F 5/00 { inductors without a potential-jump or surface barrier specially adapted for integrated circuits, details thereof and multistep manufacturing processes therefor H01L 28/10 })

H01F 2017/0006 . { Printed inductances (printed coils for dynamo-electric machines H02K 3/26 ; printed circuits H05K) }

H01F 2017/0013 . . { with stacked layers (H01F 27/2804 takes precedence) }

H01F 2017/002 . . . Details of via holes for interconnecting the layers

H01F 2017/0026 . . . Multilayer LC-filter

H01F 2017/004 . . with the coil helically wound around an axis without a core

H01F 2017/0046 . . with a conductive path having a bridge

H01F 2017/0053 . . with means to reduce eddy currents
H01F 2017/006 . . flexible printed inductors
H01F 2017/0066 . . with a magnetic layer
H01F 2017/0073 . . with a special conductive pattern, e.g. flat spiral
H01F 2017/008 . . Electric or magnetic shielding of printed inductances
H01F 2017/0086 . . on semiconductor substrate (inductors for integrated circuits H01L 28/10)

H01F 2017/0093 . Common mode choke coil

H01F 2017/04 . with magnetic core
H01F 2017/045 . . { with core of cylindric geometry and coil wound along its longitudinal axis, i.e. rod or drum core }
H01F 2017/046 . . . helical coil made of flat wire, e.g. with smaller extension of wire cross section in the direction of the longitudinal axis
H01F 2017/048 . . with encapsulating core, e.g. made of resin and magnetic powder
H01F 2017/06 . . with core substantially closed in itself, e.g. toroid
H01F 2017/065 . . . Core mounted around conductor to absorb noise, e.g. EMI filter
H01F 2017/067 . . . Core with two or more holes to lead through conductor

H01F 2019/00 **Fixed transformers or mutual inductances of the signal type** (H01F 36/00 takes precedence)

H01F 2019/04 . Transformers or mutual inductances suitable for handling frequencies considerably beyond the audio range (resonant circuits H03H)
H01F 2019/08 . . Transformers having magnetic bias, e.g. for handling pulses
H01F 2019/085 . . . Transformer for galvanic isolation

H01F 2021/00 **Variable inductances or transformers of the signal type** (H01F 36/00 takes precedence)

H01F 2021/12 . discontinuously variable, e.g. tapped
H01F 2021/125 . . Printed variable inductor with taps, e.g. for VCO

H01F 2027/00 **Details of transformers or inductances, in general**

H01F 2027/06 . Mounting, supporting or suspending transformers, reactors or choke coils { not being of the signal type }
H01F 2027/065 . . Mounting on printed circuit boards

H01F 2027/28 . Coils ; Windings ; Conductive connections
H01F 2027/2804 . . { Printed windings }
H01F 2027/2809 . . . on stacked layers
H01F 2027/2814 . . . with only part of the coil or of the winding in the printed circuit board, e.g. the remaining coil or winding sections can be made of wires or sheets
H01F 2027/2819 . . . Planar transformers with printed windings, e.g. surrounded by two cores and to be mounted on printed circuit

H01F 2027/2823 . . { Wires (H01F 27/2866 takes precedence) }
H01F 2027/2833 . . . using coaxial cable as wire
H01F 2027/2838 . . . using transposed wires
H01F 2027/2842 . . . Wire coils wound in conical zigzag to reduce voltage between winding turns
H01F 2027/2847 . . { Sheets; Strips (H01F 27/2866 takes precedence) }
H01F 2027/2857 . . . Coil formed from wound foil conductor
H01F 2027/2861 . . . Coil formed by folding a blank
H01F 2027/29 . . Terminals ; Tapping arrangements { for signal inductances }
H01F 2027/292 . . . { Surface mounted devices }
H01F 2027/295 . . . . with flexible terminals
H01F 2027/297 . . . with pin-like terminal to be inserted in hole of printed path
H01F 2027/32 . . Insulating of coils, windings, or parts thereof
H01F 2027/327 . . . { Encapsulating or impregnating (encapsulating coil and core H01F 27/022) }
H01F 2027/328 . . . . Dry-type transformer with encapsulated foil winding, e.g. windings coaxially arranged on core legs with spacers for cooling and with three phases
H01F 2027/329 . . . Insulation with semiconducting layer, e.g. to reduce corona effect

H01F 2027/34 . Special means for preventing or reducing unwanted electric or magnetic effects, e.g. no-load losses, reactive currents, harmonics, oscillations, leakage fields
H01F 2027/348 . . Preventing eddy currents

H01F 2027/40 . Structural association with built-in electric component, e.g. fuse
H01F 2027/402 . . { Association of measuring or protective means }
H01F 2027/404 . . . Protective devices specially adapted for fluid filled transformers
H01F 2027/406 . . . Temperature sensor or protection
H01F 2027/408 . . Association with diode or rectifier

H01F 2029/00 **Variable transformers or inductances not covered by group H01F 21/00** { (tap change devices H01H 9/0005) }

H01F 2029/14 . with variable magnetic bias ({ amplitude modulation by means of variable impedance element H03C 1/08 } ; magnetic amplifiers H03F ; { circuits for automatic telephonic communication H04M 3/00 })
H01F 2029/143 . . with control winding for generating magnetic bias

H01F 2038/00 **Adaptations of transformers or inductances for specific applications or functions**

H01F 2038/003 . High frequency transformer for microwave oven

H01F 2038/006 . matrix transformer consisting of several interconnected individual transformers working as a whole

H01F 2038/02 . for non-linear operation
H01F 2038/023 . . { of inductances }
H01F 2038/026 . . . non-linear inductive arrangements for converters, e.g. with additional windings

H01F 2038/12 . Ignition, e.g. for IC engines

H01F 2038/122 . . with rod-shaped core

H01F 2038/125 . . with oil insulation

H01F 2038/127 . . with magnetic circuit including permanent magnet

H01F 2038/14 . Inductive couplings { (for charging batteries from ac mains by converters H02J 7/025) }

H01F 2038/143 . . for signals

H01F 2038/146 . . in combination with capacitive coupling

H01F 2038/20 . Instruments transformers

H01F 2038/22 . . for single phase ac

H01F 2038/28 . . . Current transformers

H01F 2038/30 . . . . Constructions

H01F 2038/305 . . . . . with toroidal magnetic core

H01F 2038/42 . Flyback transformers

H01F 2038/423 . . with adjusting potentiometers

H01F 2038/426 . . with gap in transformer core

H01F 2041/00 Apparatus or processes specially adapted for manufacturing or assembling the devices covered by this subclass

H01F 2041/02 . for manufacturing cores, coils, or magnets (H01F 41/14 takes precedence; for dynamo-electric machines H02K 15/00)

H01F 2041/04 . . for manufacturing coils { (coils for transformer or inductances H01F 27/28) }

H01F 2041/06 . . . Winding

H01F 2041/065 . . . . { Winding coils of special form }

H01F 2041/0662 . . . . . Winding saddle or deflection coils