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(71) Applicant: **ARTEMIDE S.p.A.**
20122 Milano (IT)

(72) Inventor: **Zanola, Fabio**
23873 Missaglia (IT)

(74) Representative: **Bergadano, Mirko et al**
Studio Torta S.p.A.
Via Viotti, 9
10121 Torino (IT)

(54) Jointed lamp

(57) A jointed lamp (1) comprises an articulated structure (2), formed by at least two elements (5a, 5b) connected by a joint (7), and a lighting head (8); the joint (7) comprises two arms, joined to respective elements (5a, 5b), and a friction device acting on the arms; the friction device comprises a closed circuit, filled with a magneto-rheological fluid, members movable with respect to each other, cooperating with the fluid in the circuit and connected to respective arms, and a magnetic actuator, acting on the fluid for changing the rheological characteristics of the fluid as a function of the magnetic field applied onto the fluid.

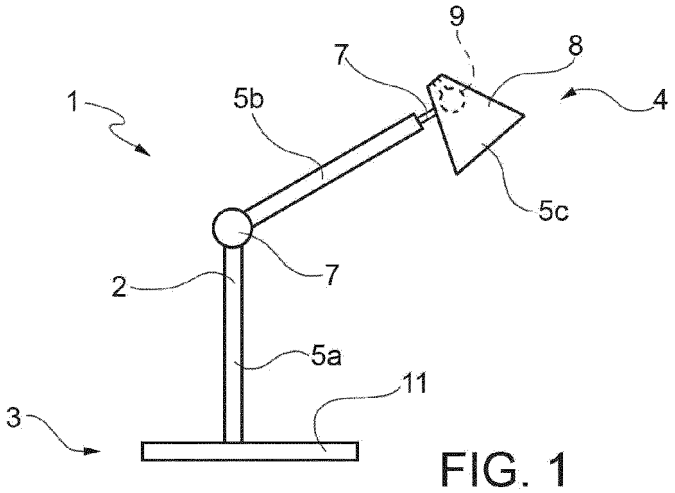

FIG. 1

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Description

[0001] The present invention relates to a jointed lamp.

[0002] In general, a jointed lamp comprises an articulated structure formed by two or more elements rotatably connected by joints. One of the elements, usually laid at an end of the articulated structure, carries one or more light sources; at the opposite end, another element acts as a base for the lamp (e.g. in the case of floor or table lamps), or is provided with fixing members for fixing the lamp to a wall or a ceiling.

[0003] The joints allow the various elements to be moved with respect to each other and thereby orientate the lamp; of course, for the articulated structure to keep the desired shape, the joints must oppose a preset resistance to the movement of the elements, in particular for preventing the elements of the articulated structure from moving by simple effect of the weight thereof; to this end, the joints are associated with contrast members, e.g. springs or tie rods, and/or are provided with mechanical frictions or other mechanisms. In order to adjust the joint resistance, the user adjusts an adjustment mechanism, typically by means of a screw.

[0004] In general, the joints of known jointed lamps are not fully satisfactory: in fact, known mechanisms may be little efficient or reliable and require repeated and frequent adjustments; they may also be subject to damage and often, they are not able to ensure an accurate adjustment and/or do not allow the full lock of the joint to be achieved.

[0005] It is an object of the present invention to provide a jointed lamp which allows the above-mentioned problems of the prior art to be fully or partly overcome; in particular, it is an object of the invention to provide a jointed lamp which has a particularly simple, effective and reliable joint adjustment system.

[0006] The present invention therefore relates to a jointed lamp as essentially defined in the appended claim 1 and, for the preferred aspects thereof, in the dependent claims.

[0007] According to the invention, the lamp joints are provided with a friction device using a magneto-rheological fluid and operable by means of a magnetic actuator (permanent magnet or electromagnet): the device allows the joint to be locked once the joint arms are in the desired position.

[0008] In this way, the normal articulation function is associated with a friction and/or mechanical lock function, obtained in a particularly simple and reliable manner.

[0009] The management of the rheological characteristics of the fluid through magnetic field allows the adjustment of the friction effect of the joint to the full lock, if needed.

[0010] Instead, any overstress may be overcome through a suitable by-pass channel.

[0011] Moreover, the replacement of known systems (of mechanical type and with mechanical regulator type) with the present invention, which is not provided with parts subject to wear, results in a higher resistance of the joint as a whole to the extended use, eliminating the need of periodical adjustment.

[0012] Further features and advantages of the present invention will be clear from the description of the following non-limiting embodiments, made with reference to the accompanying figures, in which:

- figure 1 is a schematic side view of a jointed lamp according to the invention;
- figure 2 is a schematic view, with sectional parts and removed parts for clarity, of a detail of the lamp of figure 1, in particular of a joint thereof;
- figure 3 is a schematic view of a variation of the joint of figure 2.

[0013] In figure 1, reference numeral 1 denotes a jointed lamp as a whole, for example a table lamp (it is however understood that the lamp of the invention may be a lamp of a different type, e.g. floor, ceiling, wall lamp, etc.).

[0014] Lamp 1 comprises an articulated structure 2, which extends between two opposite ends 3, 4 and is formed by at least two elements 5 connected by a joint 7, and a lighting head 8, provided with at least one light source 9.

[0015] Structure 2 may of course comprise a plurality of elements 5, pairs of consecutive elements 5 being connected by respective joints 7.

[0016] In the example of figure 1, structure 2 comprises three articulated elements 5, sequentially arranged and connected by two joints 7; starting from end 3, structure 2 comprises: an element 5a provided with a supporting base 11 (and/or fixing members for fixing lamp 1 to a wall or a ceiling), an intermediate element 5b, and an element 5c arranged at end 4 and which carries the lighting head 8; element 5b is arranged between elements 5a, 5c and is connected to them through joints 7.

[0017] For simplicity, only joint 7 will be described in detail hereinafter among elements 5a, 5b; it is understood that the other joint may also be of the same type.

[0018] With reference to figure 2, joint 7 comprises two arms 12, connected to respective elements 5, and a friction device 13 acting on arms 12.

[0019] Device 13 comprises a casing 14 containing a closed circuit 15, filled with a magneto-rheological fluid, members 16 movable with respect to each other, cooperating with the fluid in circuit 15 and connected to respective arms 12, and a magnetic actuator 18, acting on the fluid.

[0020] In particular, circuit 15 is shaped as a closed loop and comprises a transmission chamber 19, having two openings 21, and a conduit 22 that connects the two openings 21 outside chamber 19 and has an intermediate narrowing 23. Chamber 19 and conduit 22 are housed into casing 14.

[0021] In the non-limiting example shown in figure 2, conduit 22 is substantially U-shaped and comprises two

branches 24, connected to respective openings 21 of chamber 19, and an intermediate section 25, which connects the two branches 24 and has narrowing 23.

[0022] The magnetic actuator 18, which for example comprises a permanent magnet or an electromagnet, is arranged close to the narrowing 23 for generating a magnetic field in the narrowing 23.

[0023] The magnetic actuator 18 is controlled by a control 26 operable by a user and which selectively activates and deactivates, and optionally adjusts, the magnetic actuator 18; for example, control 26 is of the on/off type and activates and deactivates the magnetic actuator 18.

[0024] If the magnetic actuator 18 comprises a permanent magnet, control 26 is, for example, configured to move the magnet (or a screen, interposed between the magnet and the narrowing) with respect to the narrowing between an active position, in which the magnet generates a magnetic field having an intensity greater than a preset threshold on the fluid in the narrowing, and an inactive position, in which the magnetic field generated by the magnet on the fluid in the narrowing has an intensity smaller than the threshold.

[0025] If magnetic actuator 18 comprises an electromagnet, control 26 is, for example, configured to selectively activate the electromagnet for generating the magnetic field having an intensity greater than the preset threshold on the fluid in the narrowing.

[0026] The fluid is a magneto-rheological fluid, i.e. a fluid having rheological characteristics changing as a function of the magnetic field applied onto the fluid; in the presence of a magnetic field, the fluid becomes more viscous/dense, up to possibly behave substantially as a solid, and generates a greater friction to sliding.

[0027] As well known, by magneto-rheological fluid it is understood a fluid (generally but not necessarily used along with a carrier fluid) which, when subjected to a magnetic field, drastically increases its apparent viscosity, up to the point of becoming or anyway behaving as a solid (in particular, a viscoelastic solid). The resistance (yield strength) of the fluid in activated status (i.e. subjected to magnetic field) may be accurately controlled by changing the intensity of the magnetic field applied.

[0028] In particular, when the magnetic field applied by the magnetic actuator 18 to the fluid in narrowing 23 exceeds the preset threshold, the fluid remains virtually blocked into narrowing 23 and prevents the circulation of the remaining fluid into circuit 15.

[0029] Preferably, as shown in figure 2, circuit 15 also comprises a by-pass channel 27 which connects the two branches 24 and is arranged in parallel to the intermediate section 25 with narrowing 23. The by-pass channel 27 is provided with a controlled valve 28, for example a valve of the type having a shutter charged by a spring: valve 28 is normally closed and closes the by-pass channel 27, but if pressure of the fluid in circuit 15 exceeds a preset threshold (equal to the strength exerted by the spring), the valve opens.

[0030] Chamber 19 is substantially cylindrical and extends along and about a central axis A; chamber 19 is delimited by a lateral wall 29 arranged about axis A and houses a rotating wheel 30; wheel 30 is eccentrically arranged into chamber 19 and rotates about a rotation axis R which is eccentric with respect to the central axis A of chamber 19; wheel 30 is provided with radially outer vanes 31 which extend from a lateral surface of wheel 30 substantially up to the lateral wall 29 of chamber 19; vanes 31 are angularly spaced apart from each other and have a different radial length; vanes 31 end with respective free ends which are substantially in contact with the lateral wall 29 of chamber 19 (or are close to the lateral wall 29 of chamber 19, being in close proximity therewith).

[0031] Openings 21 are, for example, formed on the lateral wall 29 and are spaced apart from each other and connected to branches 24, respectively.

[0032] Casing 14 is integrally carried by an arm 12a connected to element 5a of structure 2; wheel 30 is rotatable into chamber 19 and with respect to casing 14 and is integrally connected to an arm 12b, connected to element 5b of structure 2, e.g. by means of one or more connecting elements 32; wheel 30 and casing 14 defines the members 16 movable with respect to each other and connected to respective arms 12.

[0033] In use, in the absence of magnetic field on the fluid, the fluid is free to circulate into circuit 15 and arms 12 can be rotated with respect to each other, thereby adjusting the position of arms 12 and of elements 5 connected to them; once the position of arms 12 (i.e. of elements 5) has been adjusted, the user can actuate, by means of control 26, the magnetic actuator 18 which generates such a magnetic field as to block the fluid into narrowing 23; the circulation of fluid into circuit 15 is therefore hindered or fully prevented by variation in the rheological characteristics of the fluid in narrowing 23; joint 7 is locked and arms 12 cannot be moved with respect to each other (unless the movement of arms 12 is forced).

[0034] The by-pass channel 27 ensures the release of joint 7 in case of forcing on joint 7 which excessively increases pressure inside chamber 19: in fact, valve 28 opens if the fluid pressure into circuit 15 exceeds the preset threshold.

[0035] According to a possible variation, the magnetic actuator 18 is associated with an adjustment system controlled by control 26: user can therefore adjust the intensity of the magnetic field generated by the magnetic actuator 18 and accordingly progressively change the rheological characteristics of the fluid, increasing the fluid resistance into narrowing 23 possibly up to the full lock of joint 7.

[0036] In the embodiment of figure 3, in which details that are similar or equal to those already described are denoted with the same reference numerals, instead of a rotatable wheel, chamber 19 houses an axially sliding piston 35.

[0037] Chamber 19 is again substantially cylindrical and extends along and about a central axis A and is delimited by a lateral wall 29 arranged about axis A; cham-

ber 19 again has two openings 21, arranged at respective axially opposite ends of chamber 19 and connected to branches 24, respectively.

[0038] Piston 35 is housed into chamber 19 and slides along axis A. Piston 35 has a head 36, substantially in radial contact with the lateral wall 29 of chamber 19, and a rod 37 connected to head 36.

[0039] Head 36 divides chamber 19 into two compartments 38, each having an opening 21 connected to conduit 22. Rod 37 is arranged into a compartment 38 and projects from a bottom wall of chamber 19.

[0040] Casing 14 which contains chamber 19 and circuit 15 is integrally carried by arm 12a; piston 35 is connected to arm 12b via a rotating mechanism 40, so that the translation movement of piston 35 along axis A determines a rotation of arm 12b with respect to the other arm 12a (and vice versa). For example, rod 37 of piston 35 is integrally connected to a rack 41 (movable along axis A along with piston 35) which engages a gear wheel 42, which is hinged to casing 14 and is connected, for example by means of one or more connecting elements 32, to arm 12b; arm 12b is rotatable integrally with the gear wheel 42, while piston 35 slides along axis A; therefore, members 16 movable with respect to each other and connected to respective arms 12 now consist of casing 14 and gear wheel 42.

[0041] Also in this case, if the magnetic actuator 18 is deactivated, the position of arms 12 of joint 7 (and thereby of elements 5 of structure 2) may be adjusted, since the fluid is freely circulating into circuit 15 from one compartment 38 to the other of chamber 19; by actuating the magnetic actuator 18, the fluid circulation is blocked and the position of arms 12 is thus maintained.

[0042] Finally, it is understood that further changes and variations may be made to the jointed lamp described and illustrated here without departing from the scope of the appended claims.

Claims

1. A jointed lamp (1) comprising an articulated structure (2), formed by at least two elements (5) connected by a joint (7), and a lighting head (8), provided with at least one light source (9); the joint (7) comprising two arms (12), joined to respective elements (5), and a friction device (13) acting on the arms (12); the lamp (1) being **characterized in that** the friction device (13)comprises a closed circuit (15), filled with a magneto-rheological fluid, members (16) movable with respect to each other and cooperating with the fluid in the circuit (15) and connected to respective arms (12), and a magnetic actuator (18), acting on the fluid for changing the rheological characteristics of the fluid as a function of the magnet field applied onto the fluid.

2. A lamp according to claim 1, wherein the circuit (15) comprises a narrowing (23) and the magnetic actuator (18) is arranged close to the narrowing (23).

3. A lamp according to claim 2, wherein the magnetic actuator (18) is controlled by a control (26) that selectively activates and deactivates the magnetic actuator (18) for generating a magnetic field having an intensity greater than a preset threshold on the fluid in the narrowing (23).

4. A lamp according to claim 2 o 3, wherein the circuit (15) comprises a transmission chamber (19), having two openings (21), and a conduit (22) that connects the two openings (21) outside the chamber (19) and is provided with the narrowing (23).

5. A lamp according to claim 4, wherein the chamber (19) is carried integrally by a first arm (12a) and houses a movable member (16) immersed in the fluid and connected to a second arm (12b).

6. A lamp according to claim 5, wherein the chamber (19) houses a rotating wheel (30) provided with radially outer vanes (31).

7. A lamp according to claim 6, wherein the wheel (30) is positioned and rotates eccentrically in the chamber (19) and the vanes (31) project from a lateral surface of the wheel (30) substantially up to a lateral wall (29) of the chamber (19).

8. A lamp according to claim 5, wherein the chamber (19) houses an axially sliding piston (35).

9. A lamp according to claim 8, wherein the piston (35) has a head (36) that separates the chamber (19) in two compartments (38), each compartment (38) having an opening (21) connected to the conduit (22), and a rod (37) that projects from the head (36) and is joined to an arm (12) via a rotating mechanism (40).

10. A lamp according to one of claims 2 to 9, wherein the circuit (15) comprises also a by-pass channel (27), set in parallel to the narrowing (23) and provided with a controlled valve (28).

11. A lamp according to claim 10, wherein the valve (28) is normally closed and closes the by-pass channel (27), and opens if the pressure of the fluid in the circuit (15) exceeds a preset threshold.

12. A lamp according to one of the preceding claims, wherein the magnetic actuator (18) is provided with an adjustment system for adjusting the intensity of the magnetic field generated by the magnetic actuator (18) and hence progressively changing the rheological characteristics of the fluid.

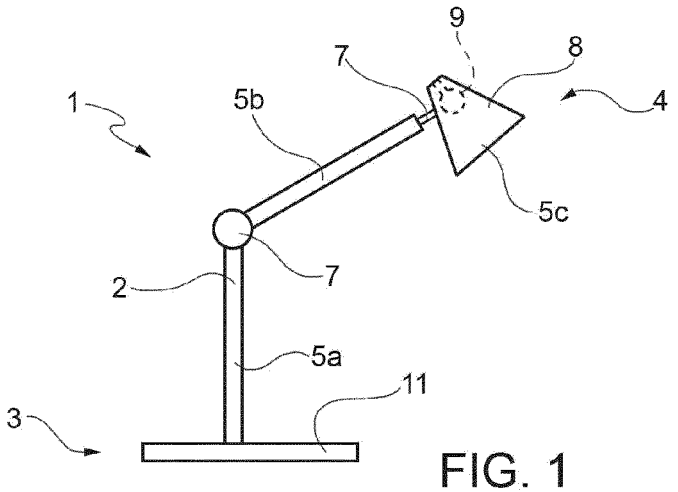
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FIG. 1

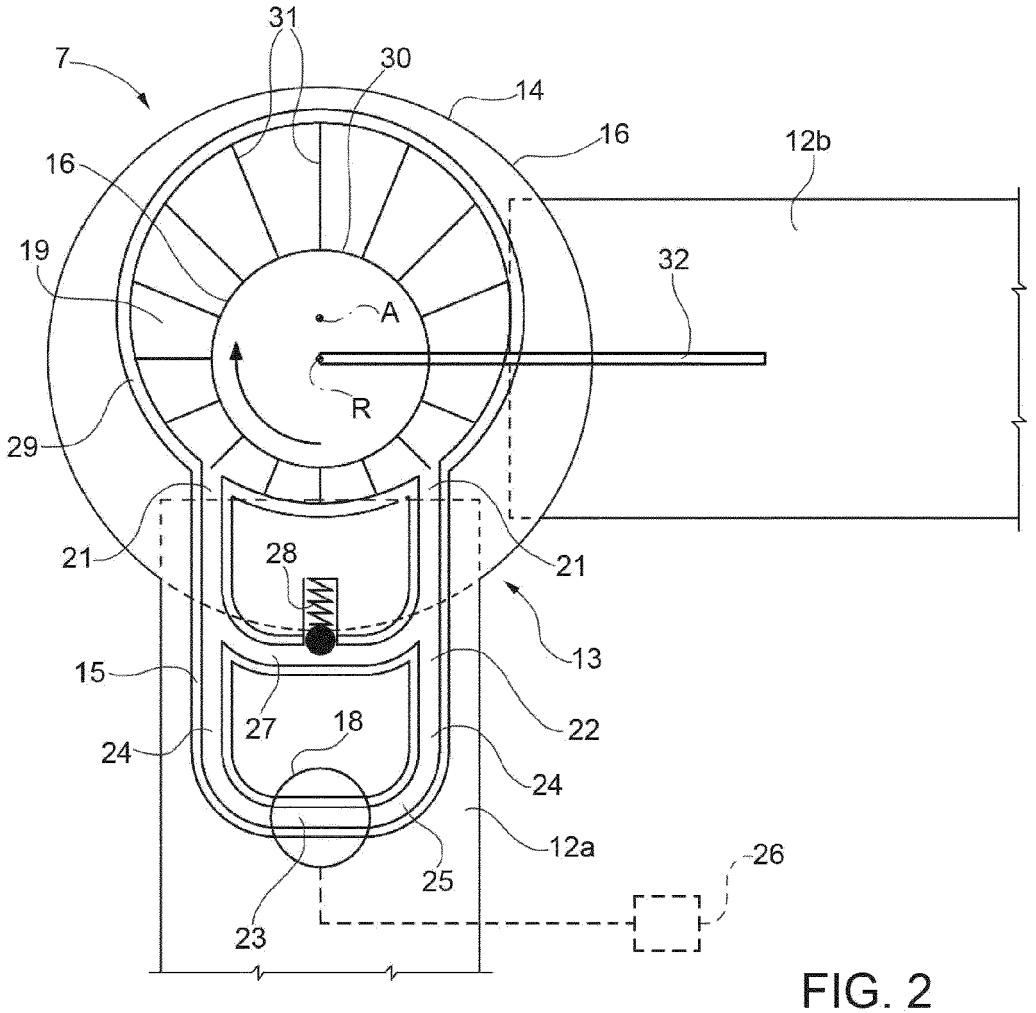
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FIG. 2

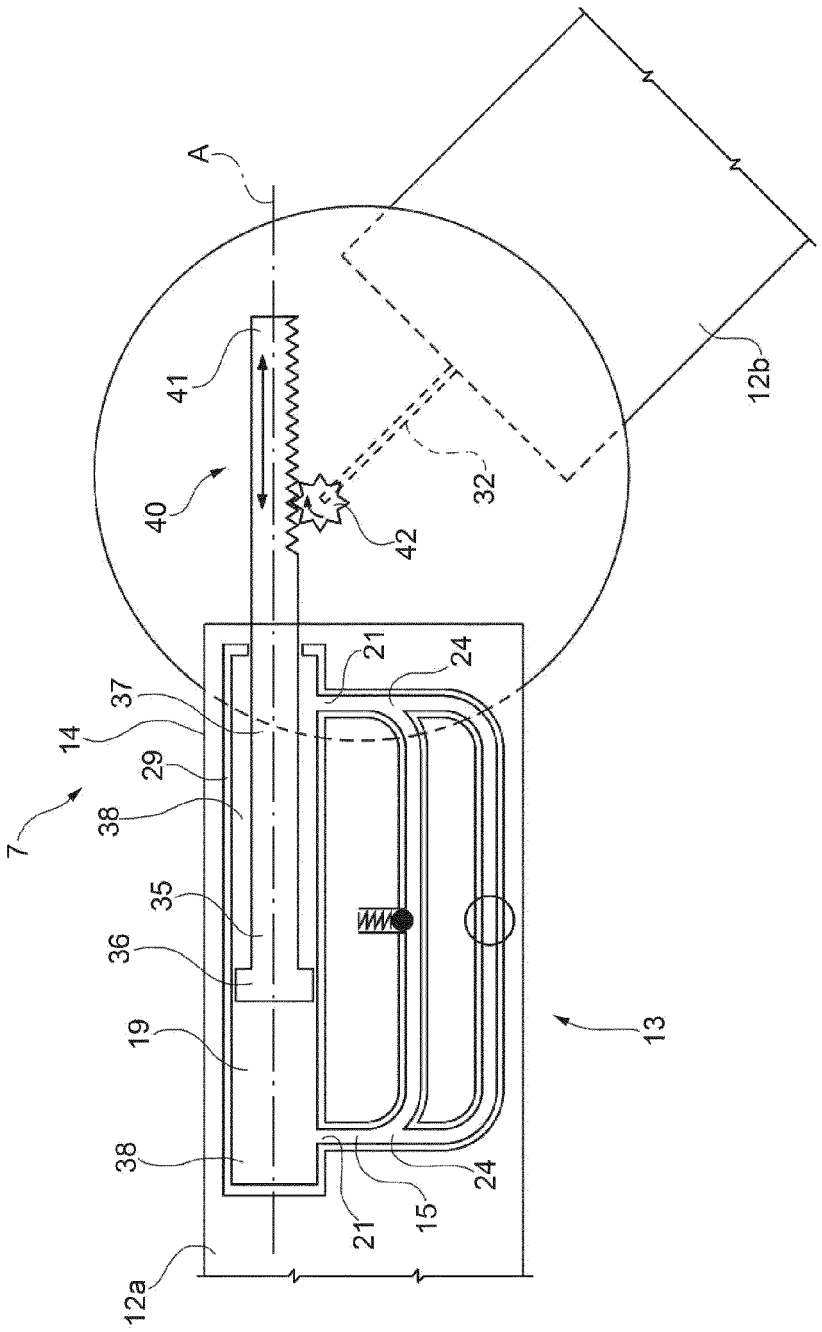

FIG. 3

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EUROPEAN SEARCH REPORT

Application Number
EP 12 19 9303

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TECHNICAL FIELDS SEARCHED (IPC)

F21V

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	21 March 2013	von der Hardt, M

CATEGORY OF CITED DOCUMENTS

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