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Declarations under Rule 4.17:

- as to the identity of the inventor (Rule 4.17(i))
- as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))

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(54) Title: A CLEANING AND SUN TRACKING DEVICE FOR PANELS OR REFLECTORS IN A SOLAR SYSTEM

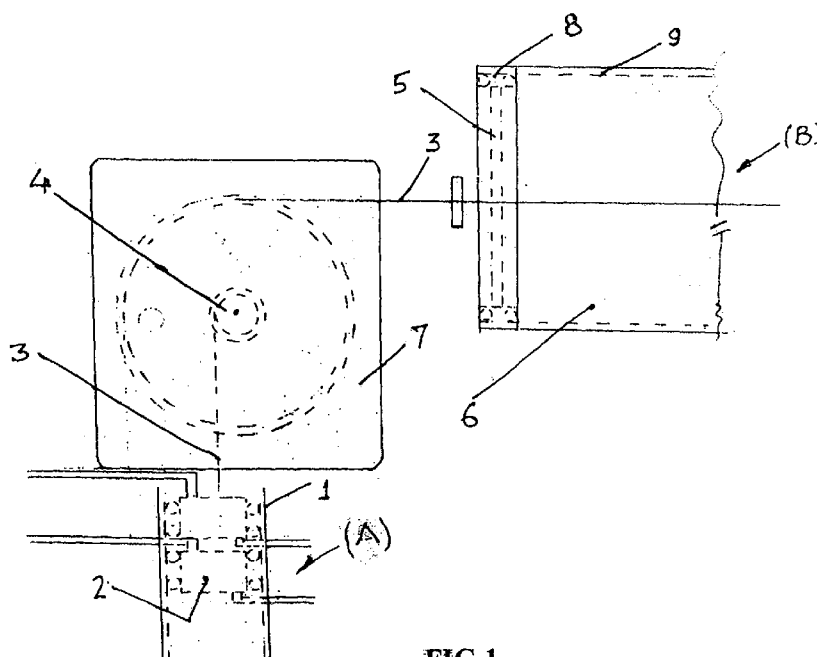


FIG.1

(57) Abstract: A cleaning and sun tracking device for panels or reflectors used in a solar system is disclosed. The device comprises movement providing means provided on both sides of a solar system to provide movement to cleaning and sun tracking means. The movement providing means has a string wrapped around a rotating shaft of said means and having at least one closed body secured at the other end of the string. The closed body is accommodated in a container such that the closed body moves up and down with the help of inflow and outflow of liquid so as to provided rotational movement to the rotating shaft of the cleaning and the sun tracking means.



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- *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))*
- *of inventorship (Rule 4.17(iv))*
- Published:**
- *with international search report (Art. 21(3))*

A CLEANING AND SUN TRACKING DEVICE FOR PANELS OR REFLECTORS IN A SOLAR SYSTEM

FIELD OF THE INVENTION

This invention relates to cleaning and sun tracking device for panels or reflectors
5 used in a solar system. The device is useful to clean or wipe solar panels or reflectors used in solar devices. The device may also be used to clean plain surface such as glass panels or any other similar surfaces.

STATE OF THE ART IN THE FIELD

In an Indian patent No. 177121, a sun tracking systems of a single and dual axis
10 is disclosed. These sun tracking systems comprises multiple number of motors and reduction gears arrangement to track the sun in order to receive optimum sun energy.

For cleaning solar reflectors and panels, water and / or soap solution is sprayed
over the reflectors and panels at high pressure. In other method each panel to be
15 cleaned is provided with wipers and motors and is cleaned with the help of water spray. In other methods robots provided with rotating wipers are employed to clean the panels and reflectors with water and / or soap solutions at high pressure. In some methods wipers with water sprays are used for cleaning manually or with vehicles. Also, for removal of snow from panels and reflectors of
20 solar energy systems wiping is mostly done manually.

DISADVANTAGES OF THE PRIOR ART

There are disadvantages associated with the known cleaning and tracking
systems / devices. One of the main disadvantages is that solar panels and
reflectors employing multiple motors having high rpm and elaborate gear
25 systems increases the capital investment.

Another disadvantage is that multiple motors and elaborate gear systems involve increased maintenance costs.

Yet another disadvantage is that more electric power is required to operate the system and due to multiple motors and reduction gears means used to operate
5 the tracking and cleaning system.

OBJECT OF THE INVENTION

Therefore, the main object of the present invention is to propose a cleaning and sun tracking device for panels or reflectors used in a solar system which obviates the disadvantages associated with the prior art.

10 Another object of the present invention is to reduce the use of the multiple motors and reduction gears and thus to reduce the maintenance cost of sun tracking and cleaning system

Yet another object of the present invention is to increase the efficiency of solar panels and reflectors due to efficient cleaning of the solar panels and reflectors.

15 Still another object of the present invention is to reduce the cost of large solar energy plants due to reduction of the multiple motors and reduction gears.

A further object of the present invention is to introduce a device with very effective and reliable cleaning and sun tracking device.

STATEMENT OF THE INVENTION

20 According to the invention there is provided a cleaning and sun tracking device for panels or reflectors in a solar system comprising movement providing means provided on both sides of a solar system to provide movement to cleaning and sun tracking means, movement providing means has a string wrapped around a rotating shaft of said means and having at least one closed body secured at the
25 other end of the string, said closed body being accommodated in a container

such that the closed body moves up and down with the help of inflow and outflow of liquid so as to provided rotational movement to the rotating shaft.

5 BRIEF DESCRIPTION OF THE DRAWINGS

A cleaning and sun tracking device for panels or reflectors in a solar system to a preferred embodiment is herein described and illustrate in the accompanying drawings, wherein;

Fig. 1 illustrates an elevation view of the device with solar panel or refelector

10 Fig. 2 illustrates plan view of a cleaning device.

Fig. 3 illustrates sun tracking means excluding panels or reflectors.

Fig. 4 illustrates another embodiment of dual axis sun tracking means excluding panels or reflectors.

15 Fig. 5 illustrates plan view of sun tracking means along with dual tracking sensors for panels or reflectors.

Fig. 6 illustrates an isometric view of tracking sensor.

DETAILED DESCRIPTION

A cleaning and sun tracking device for panels or reflectors in a solar system is described herein below with numerous specific details so as to provide a
20 complete understanding of the invention. However these specific details are exemplary details and should not be treated as the limitation to the scope of the invention. The invention may be performed with slight modifications.

Referring to figure 1 a cleaning and sun tracking device for panels and reflectors in a solar system is shown. The device comprises movement providing means
25 (A) provided on both sides of a solar system to provide movement to cleaning means (B). The movement providing means (A) comprises an outer container 1 to accommodate therein at least one closed body 2 adapted to move up and down with the help of inflow and outflow of liquid. The inflow or the out flow of the

liquid is obtained with the help of pump. The inflow or out flow of the liquid increases or decreases the weight of the closed body and a rotating shaft is thus rotated. The closed body 2 is connected with the help of one end of a string 3, the other end of the string 3 is wrapped 5 to 30 rounds over the shaft 4 depending the diameter of the rotating shaft 4 for rotating in one direction and for rotation of the rotating shaft 4 in other direction the same arrangement is provided. Cleaning means B is provided to clean the solar panels or reflector 6.

According to an embodiment plurality of closed bodies 2 are provided in the respective containers 1 and are connected with each other such that to provide quantity of liquid in the closed bodies depending upon the torque required to the respective rotating shaft 4.

According to another embodiment closed bodies 2 are filled or emptied with the help of inflow or out flow of liquid to make the closed bodies 2 to move down or to move up for clockwise or anti clockwise rotation of the rotating shaft 4.

According to another embodiment, the outer container 1 is filled or emptied with the help of inflow or out flow of liquid to make the closed body 2 to move up or down for clockwise or anticlockwise rotation of the rotating shaft 4.

The rotating shaft 4 is provided with a pulley 7 mounted thereon and having a string 3 wrapped around the pulley 7 such that to operate cleaning means in forward and backward direction. According to an embodiment a gear means 7 different diameters may be provided in place of pulleys on the rotating shaft 4. Thus entire surface of panels or reflectors is cleaned by the wiper 5 with the help of even small rotation of the shaft 3.

Referring to Fig. 2 the cleaning means B are illustrated. The cleaning means comprises at least one wiper / brush 5 secured with the string 3 provided to operated said wiper / brush 5. In one embodiment cleaning means comprises plurality of wipers / brushes 5 secured with the string 3 provided to operate said

wipers / brushes 5. Guiding means, for example, wheels 8 and rails 9 are provided to facilitate the smooth movement of the wipers / brushes 5.

In one embodiment a plurality of wipers / brushes 5 may be connected with each other in such a way the all the wipers moves simultaneously with the movement
5 of one wiper to clean the entire surface of panels or reflectors. In one embodiment the wipers / brushes 5 are provided with liquid supply means to facilitate cleaning operation.

Referring to Fig. 3 illustrates sun tracking means are shown. The sun tracking means comprises plurality of outer containers 1, each outer container 1
10 accommodating therein at least one closed body 2 adapted to move up and down with the help of inflow or out flow of liquid facilitated by at least pump 10. Outer containers 1 and pumps 10 may be any numbers depending upon the requirements. In one embodiment a tank is provided for storage of liquid required for circulation with the help of pipes provided for connecting the containers such
15 as to facilitate the inflow and outflow of liquid.

In one embodiment a gear box 7 adapted to be operated by the rotating shaft 4 is provided to operate the sun tracking means in a clock wise and anti clock wise direction depending upon the position of the sun to obtain optimum sun light. A sensor (D) is provide to generate signals and send the same to the locking
20 means (E) provided to lock and unlock the rotating shaft 4 depending on the position of the sun. Locking means (E) comprises an electromagnetic lock having a gear teeth 11 provided on the rotating shaft 4 and a brake shoe 12 is operated by an electromagnetic force to engage with the said gear teeth 11 to lock the rotation of the shaft 4 so as to obtain optimum sun light. The brake shoe 12 is
25 operated by the signals obtained from the sensor (D).

According to an embodiment the sensor (D) as shown in Figure – 6 comprises a plurality of blackened plates 16 placed one over the other with a uniform gap 17

to allow passage of the sun rays there through. An optical means 18 are provided to focus the sun rays on a flat surface 19 in a linear manner and a heat sensor / thermocouple 15 is provided on the flat surface 19 to generate signals to lock and unlock the rotating shaft 4 according to the predetermined temperature in order to receive optimum sun rays.

Referring to Fig. 4, dual axis sun tracking means are shown. The sun tracking means comprises a pair of shafts 4A and 4B so as to move the solar panels 6 in a clock wise and anti clock wise direction and also in upward and downward direction to receive optimum sun light.

- 10 In one embodiment the dual axis tracking means comprises a frame 13 adapted to rock along the axis of the shaft 4A up and down and another frame 14 mounted rotatably on the said frame 13 being adapted to rock along the perpendicular shaft 4B axis to give the movement in order to have the dual axis movement of the panel or reflectors provided by the rotation of shafts 4A and 4B.
- 15 The said frames 13 and 14 are provided with panels or reflectors to receive the sun rays. The dual axis tracking provides optimum sun energy to the panels or reflectors.

Referring to Fig. 5 illustrates plan view of panels or reflectors 6 with dual sun tracking sensors (D) for sun tracking means. It also illustrates the panels or reflectors 6 cleaning device having wipers 5 provided with guiding means to clean the panels and reflectors 6. The dual sensors (D) for tracking means are provided to generate the signals at the point of optimum heat for dual axis tracking. In one embodiment means are provided to spray water or soap solution for cleaning the panels or reflectors 6.

- 25 Certain features of the invention have been described with reference to the example embodiments. However, the description is not intended to be construed in a limiting sense. Various modifications of the example embodiments as well as

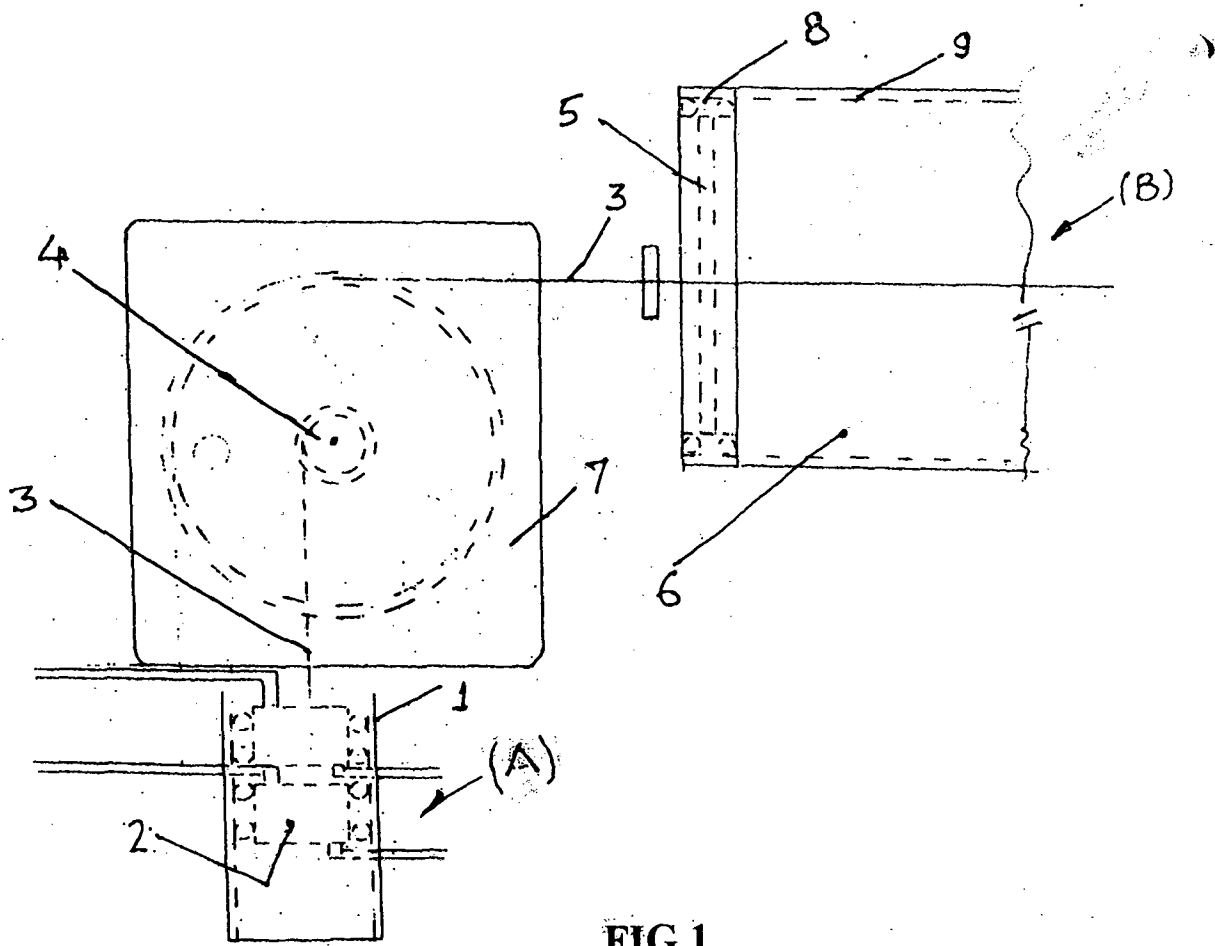
other embodiments of the invention, which are apparent to the persons skilled in the art to which the invention pertains, are deemed to lie within the spirit and scope of the invention.

CLAIMS:

1. A cleaning and sun tracking device for panels or reflectors used in a solar system comprising movement providing means provided on both sides of a solar system to provide movement to cleaning and sun tracking means,
5 movement providing means has a string wrapped around a rotating shaft of said means and having at least one closed body secured at the other end of the string, said closed body being accommodated in a container such that the closed body moves up and down with the help of inflow and outflow of liquid so as to provided rotational movement to the rotating
10 shaft.
2. The cleaning and sun tracking device as claimed in claim in claim 1, wherein a plurality of closed bodies are accommodated in the respective container.
3. The cleaning and sun tracking device as claimed in claim 2, wherein said
15 closed bodies are connected with each other such that to provide quantity of liquid in the closed bodies depending upon the torque required to the respective shaft.
4. The cleaning and sun tracking device as claimed in claim in claim 1, wherein said rotating shafts being provided with a pulley mounted thereon
20 and having a string wrapped around the pulley such that to operate cleaning means in forward and backward direction.
5. The cleaning and sun tracking device as claimed in claim in claim 4, wherein cleaning means comprises at least one wiper / brush secured with the string provided to operated said wiper / brush.

6. The cleaning and sun tracking device as claimed in claim in claim 5, wherein cleaning means comprises plurality of wipers / brushes secured with the string provided to operate said wipers / brushes.
- 5 7. The cleaning and sun tracking device as claimed in claim in claim 6, wherein guiding means being provided to facilitate movement of the wipers / brushes.
8. The cleaning and sun tracking device as claimed in claim in claim 7, wherein the wipers / brushes being provided with liquid supply means to facilitate cleaning operation.
- 10 9. The cleaning and sun tracking device as claimed in claim in claim 1, wherein the sun tracking means comprises a gear box adapted to be operated by the rotating shaft being provided to operate the sun tracking means in a clock wise and anti clock wise direction depending upon the position of the sun to obtain optimum sun light.
- 15 10. The cleaning and sun tracking device as claimed in claim in claim 9, wherein sun tracking means comprises a sensor to provide signals to locking means provided to lock and unlock the rotating shaft depending on the position of the sun.
- 20 11. The cleaning and sun tracking device as claimed in claim in claim 10, wherein the sensor comprises a plurality of blackened plates placed one over the other with a uniform gap to allow passage of the sun rays there through, an optical means being provided to focus the sun rays on a flat surface in a linier manner and a heat sensor being provided on the flat surface to generate signals to lock and unlock the shaft according to the
25 predetermined temperature in order to receive optimum sun rays.

- 5 12. The cleaning and sun tracking device as claimed in claim 10, wherein the locking means comprises an electromagnetic lock having a teeth provided on the shaft and a brake shoe operated by an electromagnetic force to engage with the said teeth to lock the rotation of the shaft to obtain optimum sun light.
13. The cleaning and sun tracking device as claimed in claim 9, wherein the sun tracking means comprises a pair of shafts so as to move the solar panels in a clock wise and anti clock wise direction and also in upward and downward direction to receive optimum sun light.
- 10 14. The cleaning and sun tracking device as claimed in claim 9, wherein a sensor is provided for each shaft.



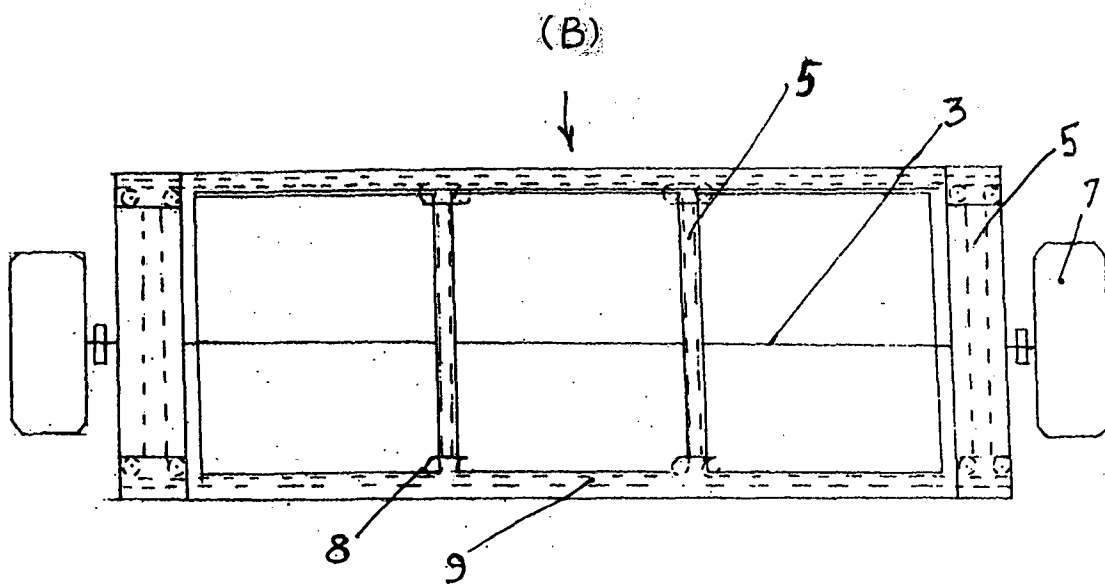


FIG. 2

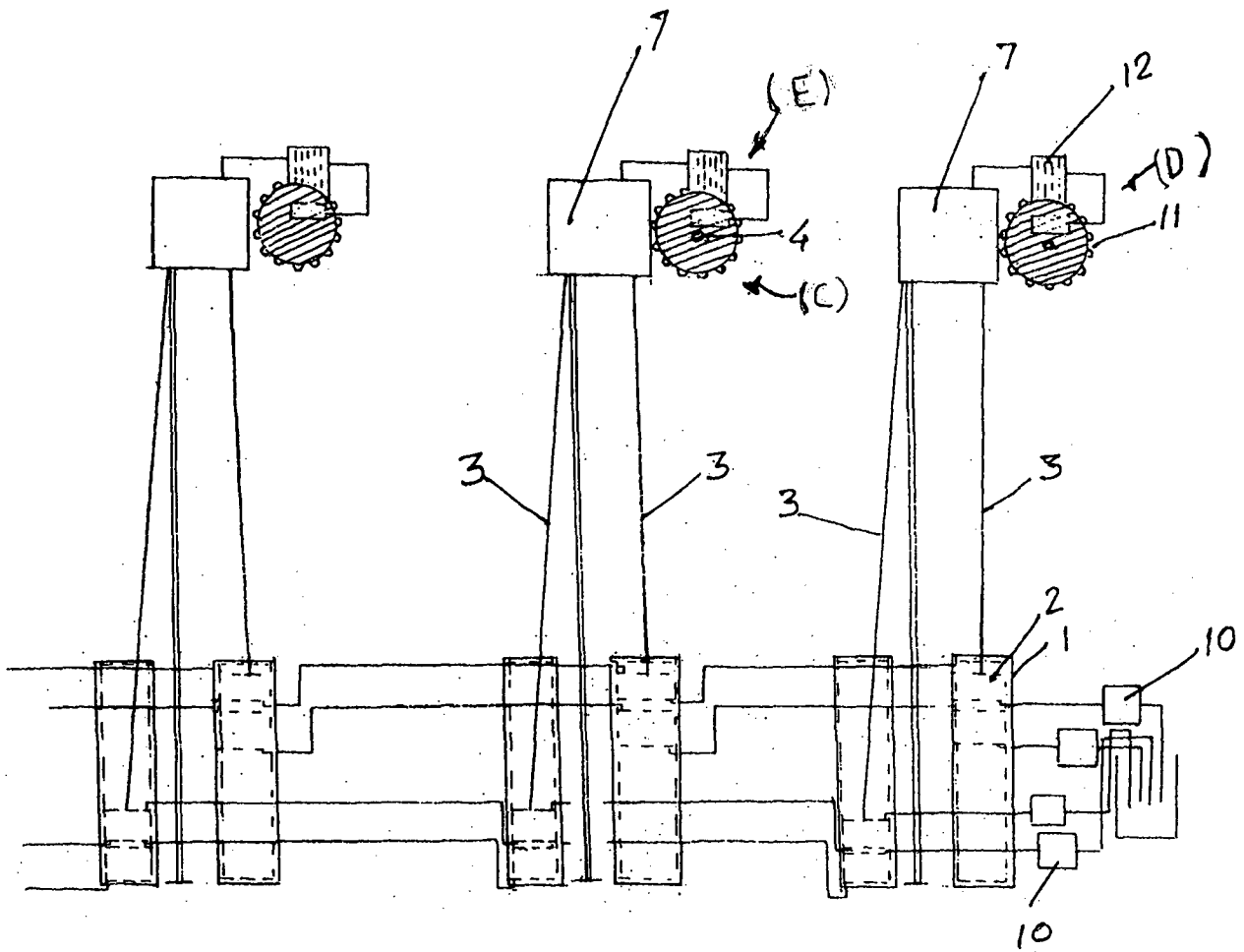


FIG. 3

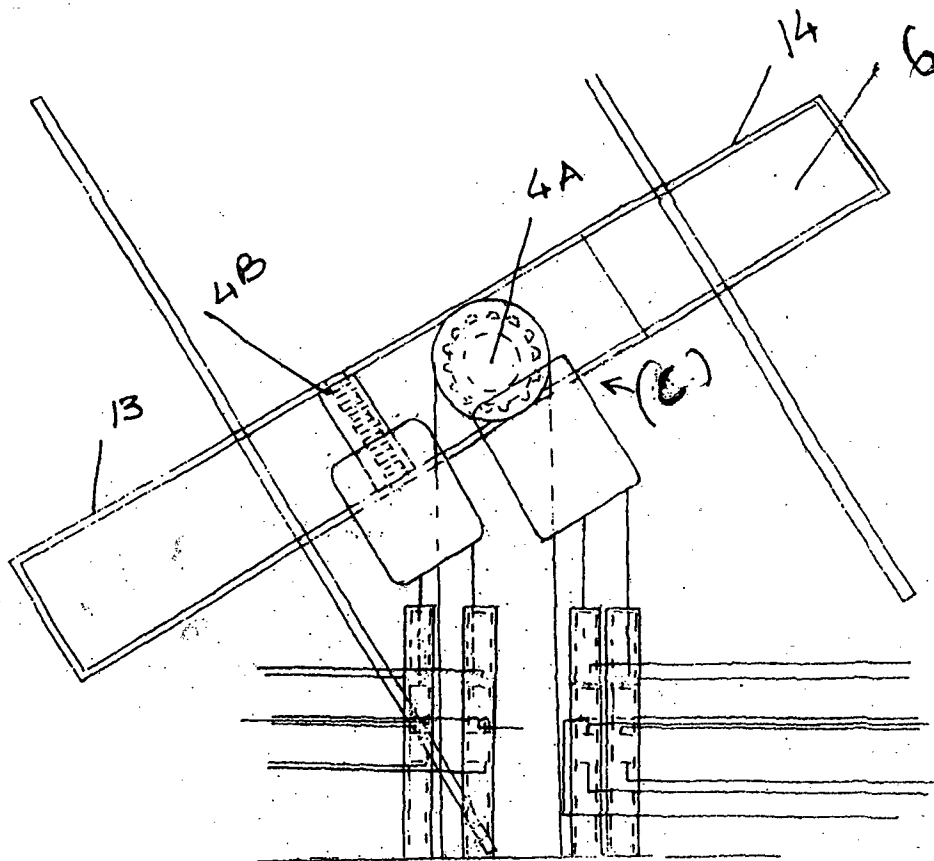


FIG. 4

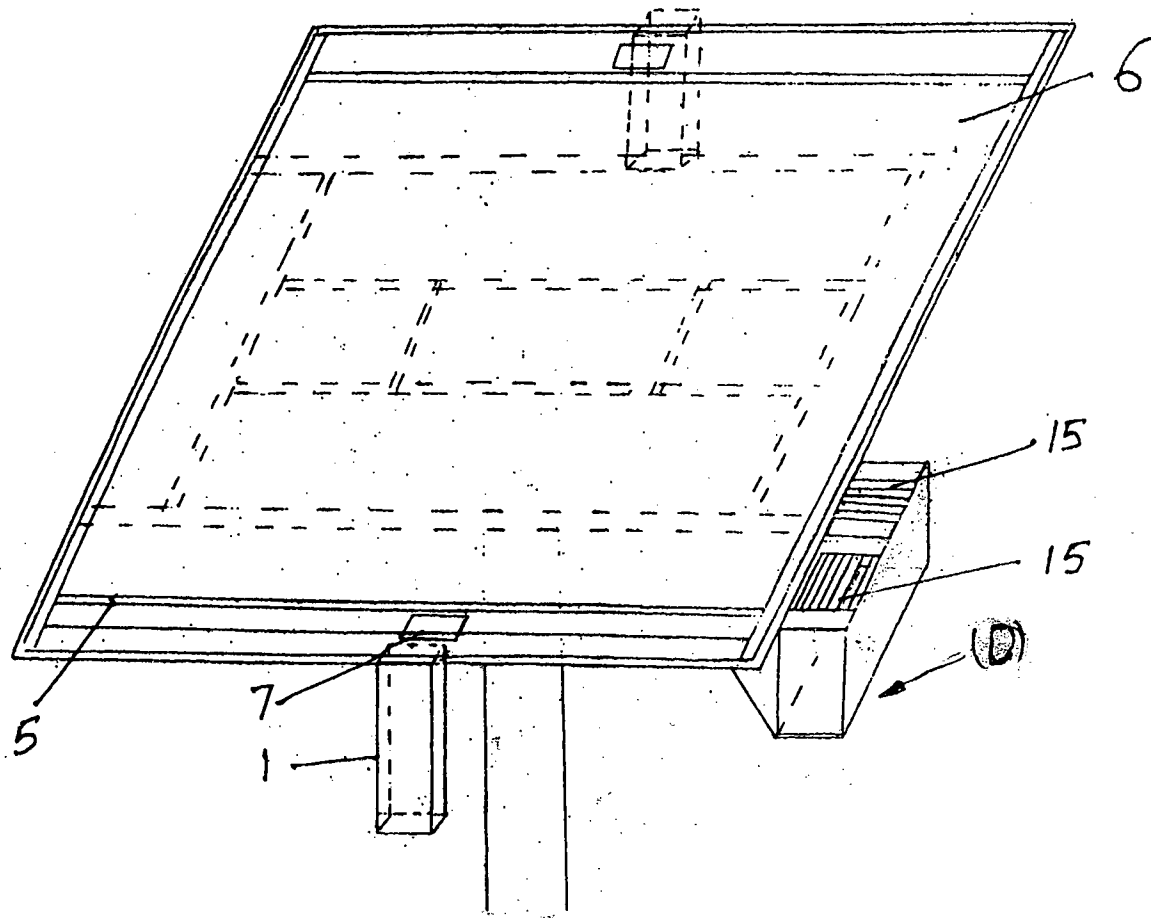


FIG. 5

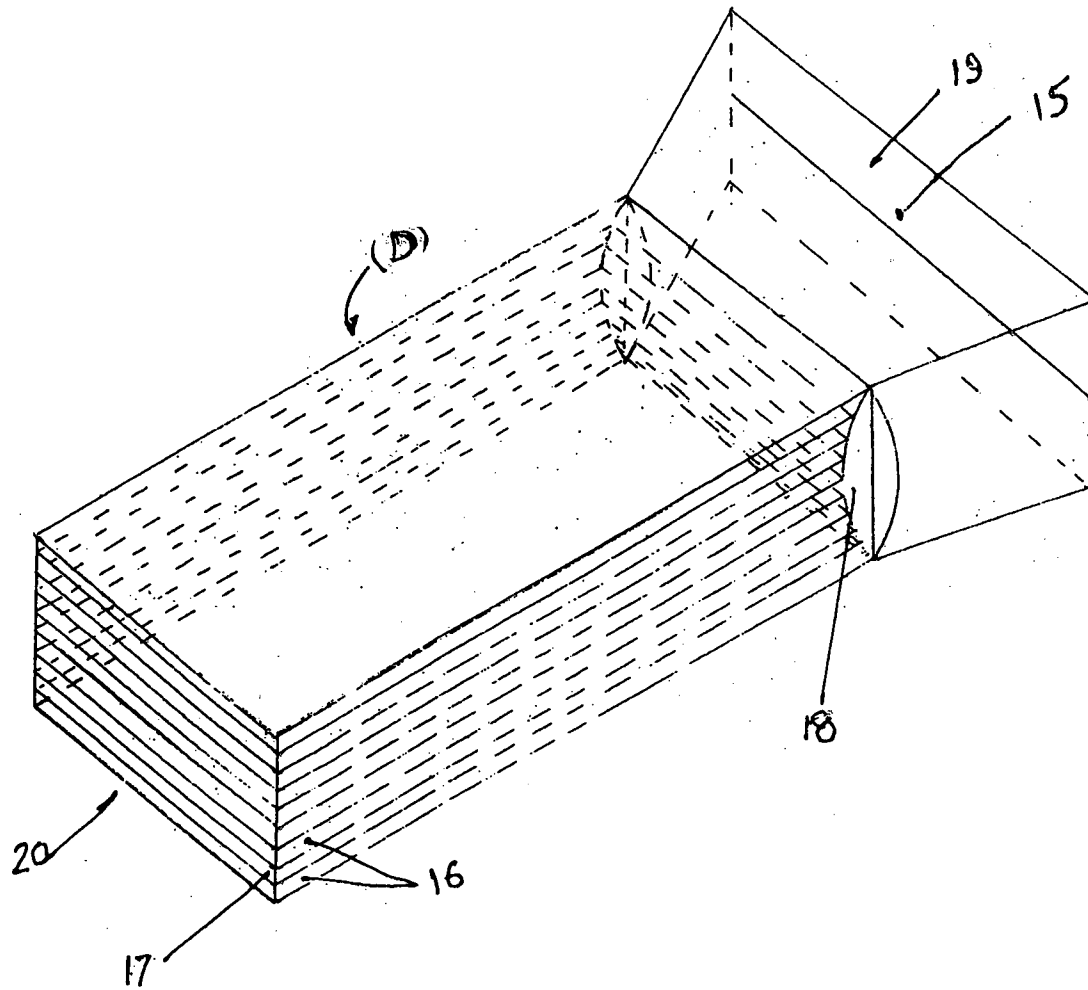


FIG.6

INTERNATIONAL SEARCH REPORT

International application No
PCT/IN2012/000075

A. CLASSIFICATION OF SUBJECT MATTER
INV. F24J2/46 F24J2/38
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
F24J

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EP0-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 2 072 933 A2 (HAWE HYDRAULIK SE [DE]) 24 June 2009 (2009-06-24)	1-4,9-14
Y	paragraphs [0053] - [0055], [0059], [0062] - [0071]; figures 2, 3d, 4 -----	5-8
X	DE 196 25 204 A1 (WIMMER ULRICH DIPL ING FH [DE]) 8 January 1998 (1998-01-08)	1-4,9-14
Y	column 3, line 43 - column 4, line 11; figure 1 -----	5-8
X	US 2009/067026 A1 (WINIARSKI LAWRENCE DECKER [US]) 12 March 2009 (2009-03-12)	1-4,9-14
Y	paragraphs [0021] - [0029]; figures 1-6 -----	5-8
	-/--	



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents :

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Date of the actual completion of the international search

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18/05/2012

Name and mailing address of the ISA/

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Axters, Michael

INTERNATIONAL SEARCH REPORT

International application No
PCT/IN2012/000075

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	DE 20 2010 007564 U1 (GSCHWENDTNER JOSEF [DE]; VOGLSINGER ANTON [DE]; VOGLSINGER JUN [DE]) 30 September 2010 (2010-09-30) paragraphs [0042], [0043], [0051], [0052]; figure 1 -----	5-8
Y	DE 20 2009 006754 U1 (HANDSCHUH MATTHIAS [DE]) 30 July 2009 (2009-07-30) paragraphs [0016] - [0020]; figures 1-3 -----	5-8

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/IN2012/000075

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
EP 2072933	A2	24-06-2009	NONE	
DE 19625204	A1	08-01-1998	NONE	
US 2009067026	A1	12-03-2009	NONE	
DE 202010007564	U1	30-09-2010	NONE	
DE 202009006754	U1	30-07-2009	NONE	