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F24H 7/00, F24J 2/34

(52) UK CL (Edition K)
F4U UEF U6234

(56) Documents cited
GB 2188410 A GB 2070762 A GB 1605037 A
GB 1585528 A GB 1501297 A EP 0208309 A2
EP 0121668 A EP 0043082 A2 WO 80/02736 A
US 4297000 A

(58) Field of search
UK CL (Edition K) F4U UEF U6208 U6234
INT CL[5] F24H
Online database:W.P.I.

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(54) Solar heat storage arrangement

(57) The outer skin of a building consists of transparent sheets (3) to focus sunlight which is directed down light fibres (8) and tubes onto elongated blocks (10) below the ground. The footings of the building are deepened and incorporate insulation. The heat from the blocks is thereby able to be slowly absorbed by the ground. Heat can be channelled through closable tubes (24) located in the ground.

FIG 3

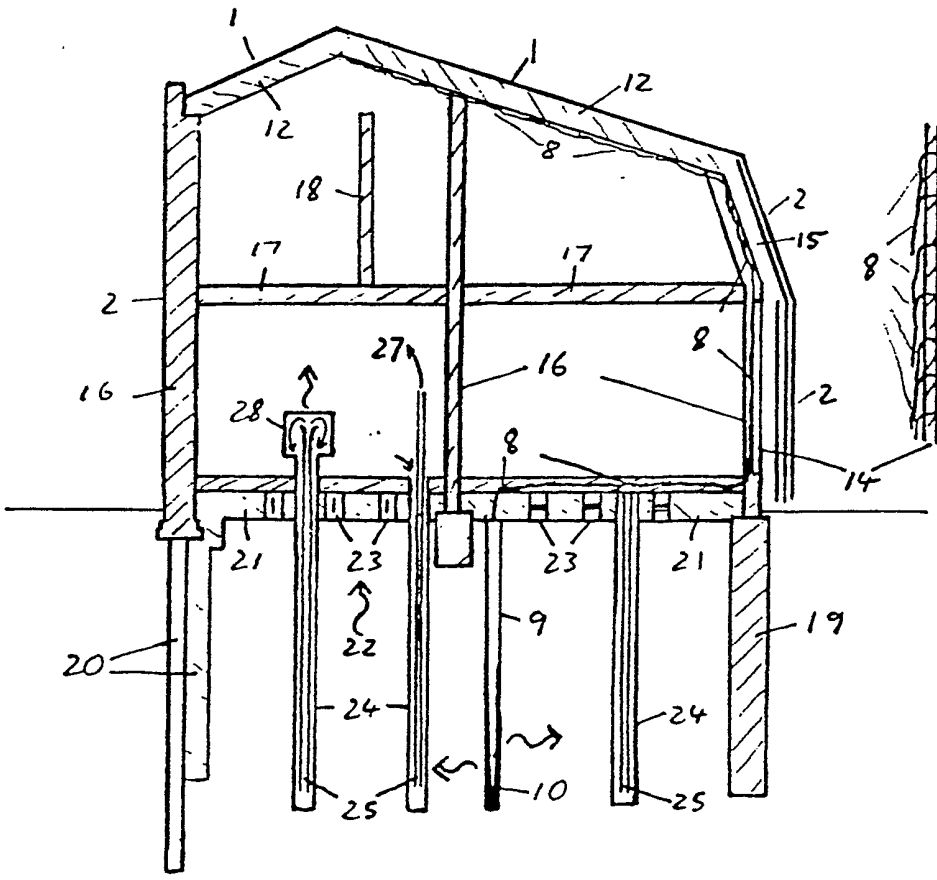
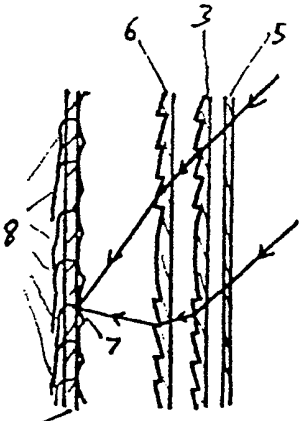


FIG 4



GB 2 249 623 A

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

FIG 1

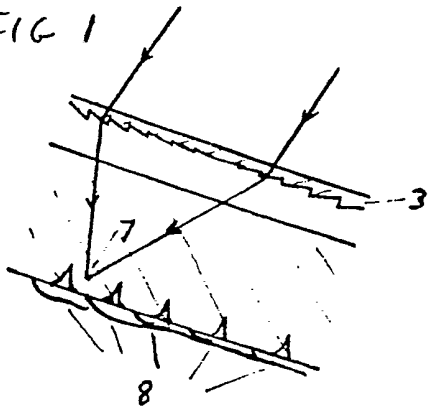


FIG 2

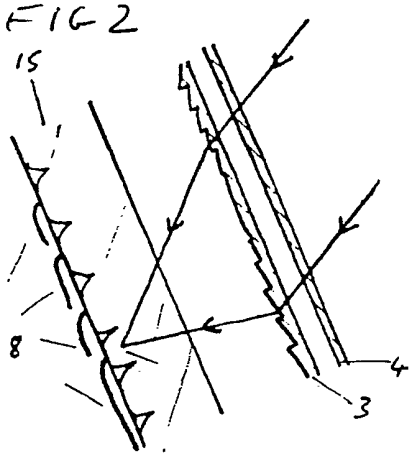


FIG 3

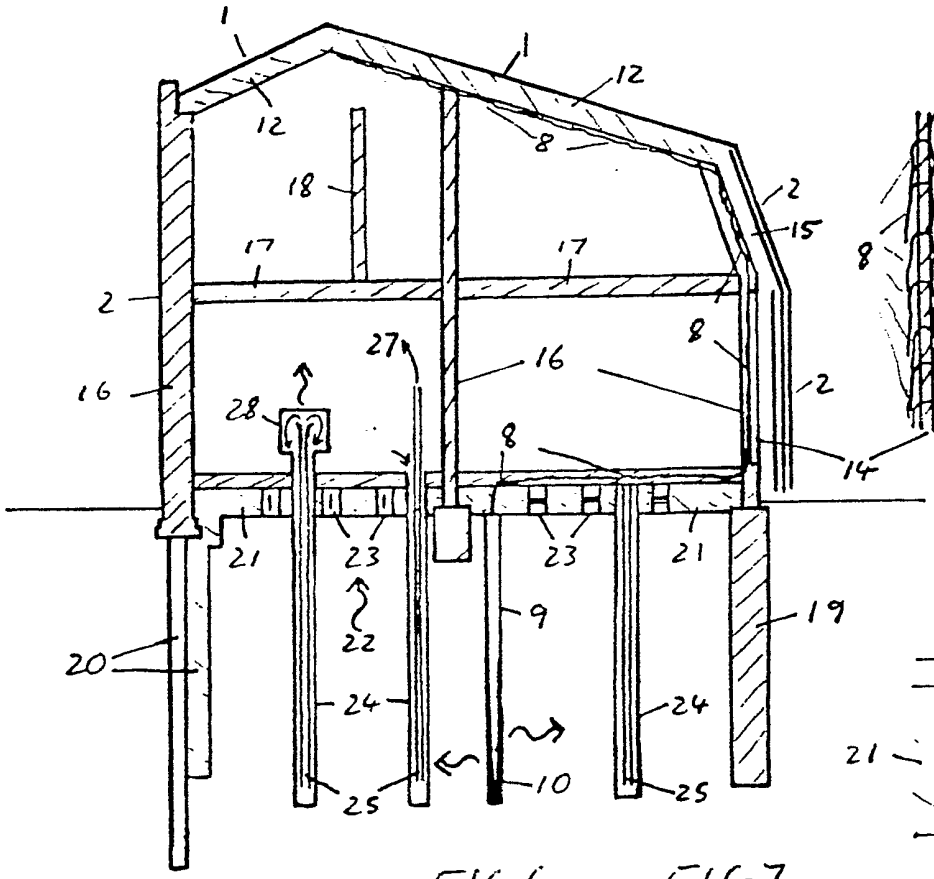


FIG 4

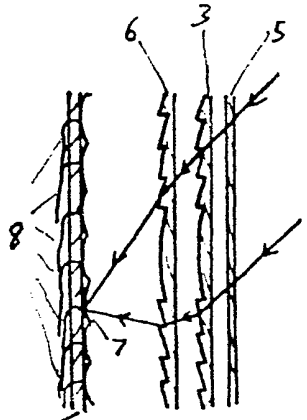


FIG 5

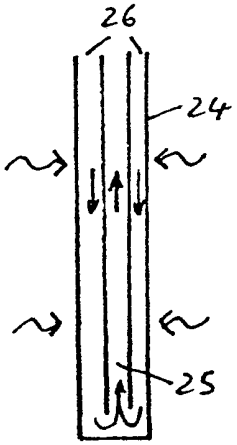


FIG 6

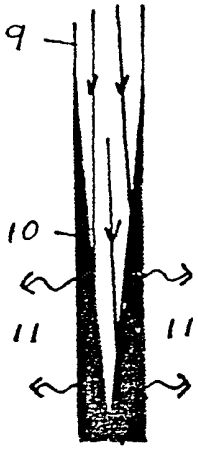


FIG 7

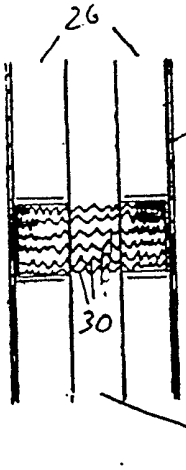


FIG 8

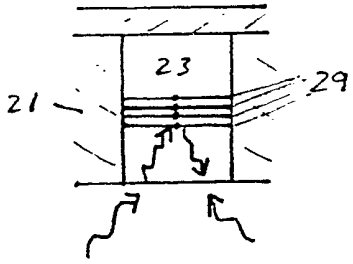
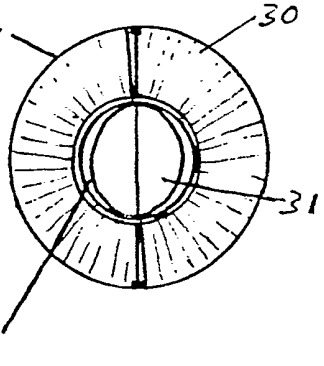


FIG 9



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DIRECT SUN STORE

This invention relates to the storage of the sun's light energy.

Usually light from the sun falls on surfaces above ground level where some is reflected back as light, while the rest is converted to heat, most of which is fairly soon afterwards lost to the atmosphere by radiation and conduction.

In the direct sun store, sunlight is directed down onto objects below ground which convert most of the light to heat, this being absorbed slowly by the surrounding ground, which becomes a heat store.

A specific embodiment of the invention will now be described by way of example with reference to the accompanying drawing.

The outer skin of the roof (1) and walls (2) of a building consists partly of transparent plastic or glass sheets (3) patterned to focus the incident sunlight, further sheets being fitted to act as double (4) or multiple (5) glazing, some being patterned for focusing (6). Behind the single and multiple layers of sheets, the light concentrates at points (7) whence it is directed along light fibres (8) and tubes (9) and down into black elongated blocks (10) below the surface, which convert the light to heat which is slowly absorbed by the ground (11). The points in some places are on insulation (12) and the internal walls (14) and elsewhere can be in transparent insulation (15) which transmits light not focused to the points (7) and thus serves as a window.

The structure of the building (16) supports the sheets (3 and 4), the insulation (12 and 15) and floor (17) and walls (18), and rests on footings. These where appropriate are deepened and widened and formed of insulation containing many air pores such as aerated or foamed concrete with lightweight or organic compound aggregate (19) or composite insulation / loadbearing material systems (20). Insulation (21) is laid over the ground heat store.

Heat will be transmitted to the building by conduction and radiation (22). Holes (23) can be formed in the insulation (21) which can allow heat passage by radiation and conduction. Tubes (24) in the ground contain air or water able to flow in a central tube (25) and return in the annulus (26), absorbing heat from the lower part of the tubes. Building air and water can be heated directly (27) by this means and the building heated by radiators (28). Fibres or flaps can be deployed to reflect back radiation, restrict flows and create still air pockets in the holes (29) and tubes (30 and 31).

CLAIMS

1. In the direct sun store sunlight is concentrated and directed onto buried objects which convert most of the light to heat, this being absorbed slowly by the surrounding ground, which becomes a heat store.

2. A system as claimed in claim 1 where transparent sheets are patterned to focus the incident sunlight.

3. A system as claimed in claim 2 where the sheets form part of the outer skin of a building.

4. A system as claimed in claim 3 where two or more sheets are used in series for focusing incident sunlight.

5. A system as claimed in claim 3 or claim 4 where two or more sheets are used to create insulating air gaps.

6. A system as claimed in any preceding claim where the light is directed by light fibres or tubes.

7. A system as claimed in claim 6 where the light fibre or tubes form part of the insulation of a building.

8. A system as claimed in any preceding claim where the light is directed down tubes sunk into the ground and heats the dark material at the bottom of the tubes.

9. A system as claimed in any preceding claim where insulation is laid on the surface of the ground heat store.

10. A system as claimed in any preceding claim where trenches are dug around the ground heat store surface and filled with insulating material.

11. A system as claimed in claim 10 where the material is foamed or aerated concrete which may have lightweight aggregates.

12. A system as claimed in claim 11 where the insulating material is also the foundation for building structures.

13. A system as claimed in any preceding claim where a building derives heat from the ground heat store.

14. A system as claimed in any preceding claim where air or water is circulated through tubes sunk into the ground heat store to transfer heat elsewhere.

15. A system as claimed in claim 14 where a tube contains a separator allowing circulation up and down within the tube.

16. A system as claimed in claim 14 or claim 15 where the circulation in the tubes can be limited by the deployment of gates, flaps, fans, or fibres.

17. A system as claimed in claim 16 where the gates, flaps, fans,or fibres are closely spaced to create insulating air gaps.

18. A system as claimed in any preceding claim where larger tubes contain smaller tubes to allow circulation.

19. A system as claimed in claim 18 where the inner tube contains discs which can be deployed to limit circulation.

20. A system as claimed in claim 18 where the annulus contains fans which can be opened to limit circulation.

21. A system as claimed in claim 19 or claim 20 where the discs and fans are deployed by rotation of the inner tubes.

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atents Act 1977
Exa ner's report to the Comptroller under Section 17 (The Search Report)

Application number 9021586.4

Relevant Technical fields

(i) UK Cl (Edition K) F4U (U6208 U6234 UEF)

(ii) Int Cl (Edition 5) F24H

Search Examiner

M C Monk

Databases (see over)

(i) UK Patent Office

(ii)

ONLINE DATABASE : WPI

Date of Search

28.5.91

Documents considered relevant following a search in respect of claims ALL

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
Y	GB A 2188410 FISHER Examples of fibre optic cable	1,6 at least
X	GB A 2070762 SOLETANCHE Example of underground heat store	1 at least
Y	GB 1605037 A NIXON Example of a flat concentrating device	1,2 at least
X	GB 1585528 A BACKLUND Example of underground heat store	1 at least
Y	GB 1501297 A KANEKO Example of a light guide	1,6 at least
Y	US 4297000 A FRIES Example of passing solar energy through an optic fibre bundle	1,6 at least
Y	EP A2 0208309 MORI Example of passing solar light ray through an optical conductor to be focussed by a lens arrangement	1,6 at least
X	EP A2 0121668 KUBOTA Example of a heat store in the base of a building	1 at least
Y	EP A2 0043082 MORI Example of a solar energy concentrating element in association with a fibre optic cable	1,6 at least
X	WO 80/02736 SODERSTROM Example of a heat store in the base of a building	1 at least

SF2(p)

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Category	Identity of document and relevant passages	Relevant to claim(s)

Categories of documents

X: Document indicating lack of novelty or of inventive step.

Y: Document indicating lack of inventive step if combined with one or more other documents of the same category.

A: Document indicating technological background and/or state of the art.

P: Document published on or after the declared priority date but before the filing date of the present application.

E: Patent document published on or after, but with priority date earlier than, the filing date of the present application.

&: Member of the same patent family, corresponding document.

Databases: The UK Patent Office database comprises classified collections of GB, EP, WO and US patent specifications as outlined periodically in the Official Journal (Patents). The on-line databases considered for search are also listed periodically in the Official Journal (Patents).

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