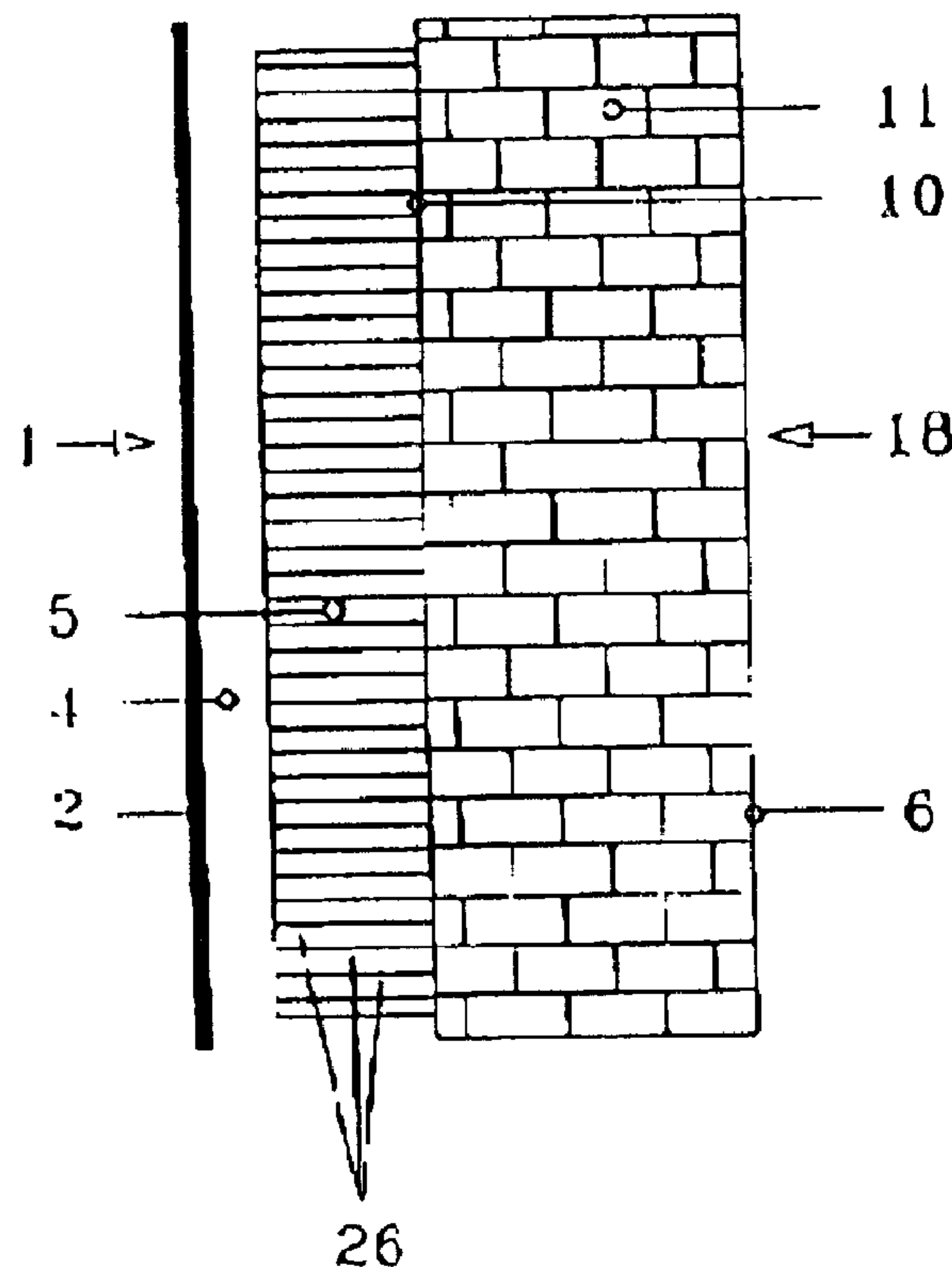




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(54) Title: THERMAL-INSULATION/THERMAL COLLECTOR ASSEMBLY



(57) Abrégé/Abstract:

Described is a combined thermal-insulation/thermal-collector assembly for the outside walls or roofs of buildings. The assembly has a heat-insulating layer which is transparent to solar radiation and is designed with a transparent structure, the heat-insulating material including a multiplicity of adjacent channels disposed in essentially the same direction as the flow of heat. The heat-insulating layer is made up of elements which are thin relative to the thickness of the layer. The channels running across the heat-insulating layer are open, have an essentially uniform diameter and thus form a transparent structure.



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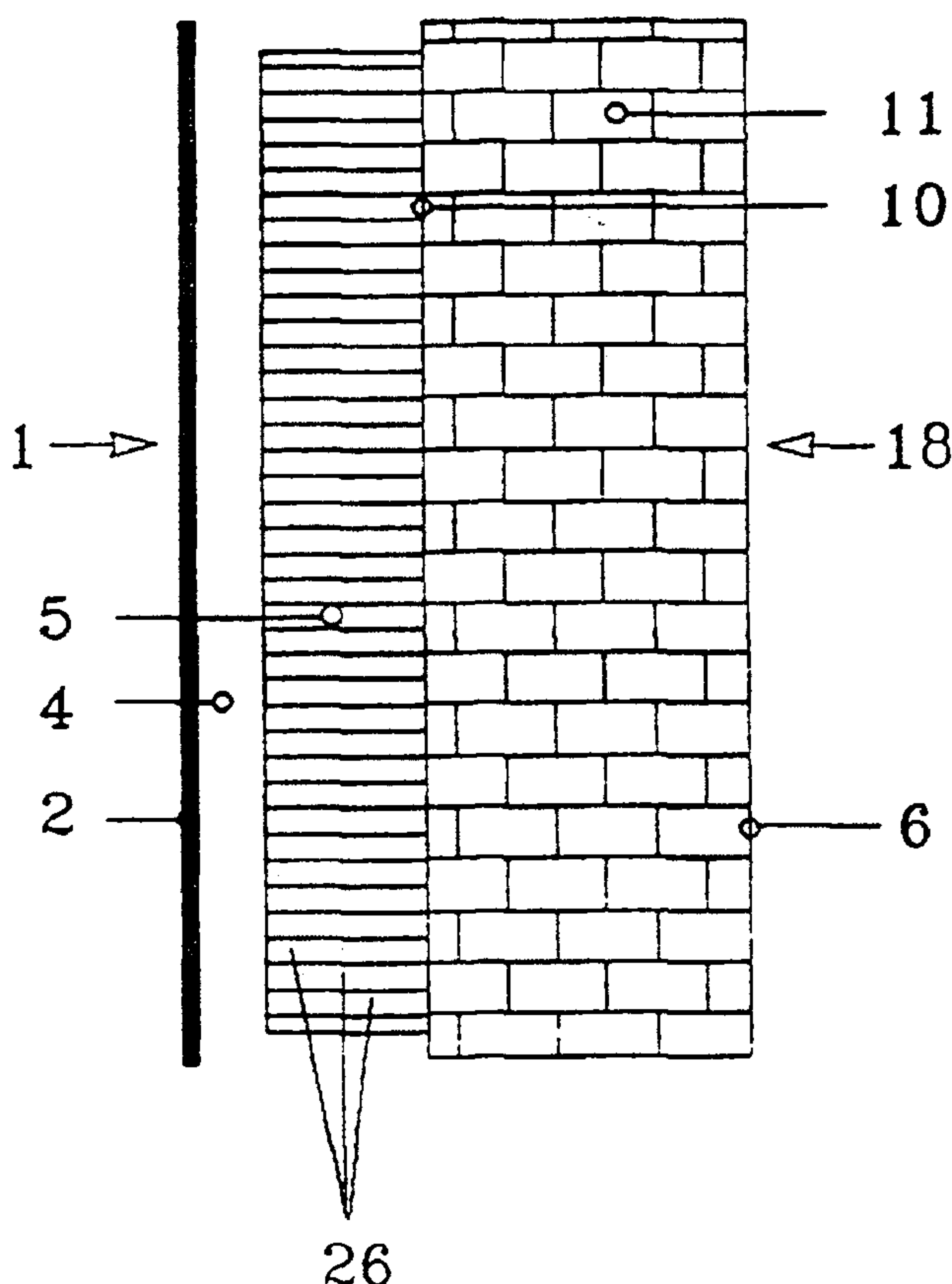
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(57) Abstract

Described is a combined thermal-insulation/thermal-collector assembly for the outside walls or roofs of buildings. The assembly has a heat-insulating layer which is transparent to solar radiation and is designed with a transparent structure, the heat-insulating material including a multiplicity of adjacent channels disposed in essentially the same direction as the flow of heat. The heat-insulating layer is made up of elements which are thin relative to the thickness of the layer. The channels running across the heat-insulating layer are open, have an essentially uniform diameter and thus form a transparent structure.

(57) Zusammenfassung

Integrierte Wärmedämmungs- und Wärmekollektoranordnung für Außenwände oder Dächer von Gebäuden, mit einer solartransparenten Wärmedämmschicht, die strukturtransparent ausgebildet ist und bei der das Dämmmaterial aus einer Vielzahl von nebeneinanderliegenden, zum Wärmestrom wenigstens nahezu gleichgerichteten Kanälen besteht, wobei die solartransparente Wärmedämmschicht aus im Verhältnis zu ihrer Schichtdicke dünnen Elementen hergestellt ist, deren durch die Wärmedämmschicht hindurch verlaufenden Kanäle offen sind, einen im wesentlichen gleichförmigen Durchmesser aufweisen und damit eine strukturtransparente Wärmedämmschicht bilden.



THERMAL-INSULATION/THERMAL COLLECTOR ASSEMBLY

The invention relates to an integrated thermal insulation arrangement for buildings having at least one solar-energy transparent thermally-insulating layer, which is constructed as a structurally transparent insulating layer, and which comprises an insulating material made of a plurality of side-by-side disposed channels, at least nearly parallel-directed to the thermal stream.

Such thermal insulation arrangements are known already, where plates of thermal-insulation material are applied to the sunny side walls of buildings, where said plates exhibit a plurality of cross-running channels, where the channels expand toward the outside and exhibit a closure which is permeable for sun irradiation, and which close at the interior side with a covering which passes the sun irradiation or which is heat-conducting and light-absorbing.

Channels of this kind have to exhibit a sufficient width in order for the irradiated solar energy to pass up to the interior side of the thermally insulating layer. In addition, a thermal-conducting internal closure of the channels also effects an increase of the thermal conduction toward the outside, which is rarely desirable in moderate climates, because the thermal losses toward the outside are thereby increased in cold weather.

It has also become known to connect heat-exchanger tubes with absorber plates at the outside of such a described thermal-insulating layer in order to collect and

to discharge solar energy prior to the reaching of the wall of the building.

Several of these structured thermal-insulating layers, which are furnished with channels, exhibit a very expensive construction and are frequently furnished in addition with reflecting metal coatings at the inner side of openings or channels of the thermal-insulating layer for the better transfer of solar energy and are to transfer in a collective way the energy to a small area.

It is disadvantageous with the conventional forms of construction that they exhibit a complex and expensive construction.

It is an object of the present invention to improve an integrated thermal-insulating arrangement of the kind initially recited such that it can be produced economically and such that an effective, durable thermal-insulating arrangement is produced, which results in high collections of solar energy and low thermal losses at times of low outside temperatures while, at times of high outside temperatures, the acceptance of solar radiation energy is decreased.

This object is achieved based on an integrated thermal-insulating arrangement of the initially recited kind

with the features of the characterizing part of claim 1.

The subclaims which, similar to claim 1, form at the same time a part of the description, refer to particularly advantageous embodiments and forms of use of the invention.

The application of a particularly simple construction of the thermal-insulating layer of thin elements allows the formation of simply produced open channels, having throughout a uniform internal diameter, which are well suited in like manner for the transfer of the radiation, the diffusion of humidity, and for the obtaining of a high mechanical strength under low use of material.

In this context, the use of particularly structured and, in particular, of wavy sheets of thermal-insulating material, and preferably with the intermediate positioning of planar sheets of the same material are simple to process and result in a well-stiffened structure of the thermal-insulating layer with channels of uniform diameter and a small diameter in comparison to the thickness of the thermal-insulating layer, and this allows an economically favorable mass production using materials available at economically favorable conditions.

In this context, the use of a corrugated cardboard-honeycomb material, such as it is used in the carpentry

business for the filling of various hollow space, is particularly advantageous, both with respect to the physical properties as well as with respect to the production.

With respect to the structurally transparent thermal-insulating layer to be protected, there results a dimension of the formed channels, wherein the length of the channels surpasses substantially the diameter of the channels, such that in case of a high position of the sun, the irradiation of solar energy penetrates less deep into the thermal-insulating layer and thereby reduces the absorption of the solar energy by the wall of the building, whereas in case of a lower position of the sun, the irradiation depth of the solar energy is increased and thereby more heat is transferred to the wall of the building.

In building walls, facing West or facing East, or walls, which are heavily subjected to the weather elements, the use of a structurally transparent thermal-insulating layer with channels directed outwardly at an inclined angle towards the bottom is more favorable because, on the one hand, the penetration of humidity into the channels is decreased and, on the other hand, the irradiation depth of solar energy is decreased even in case of a low position of

the sun based on the self-opacity of the channels.

The application of a fibrous cellulose material for the construction of the thermal-insulating layer allows the inking and the furnishing with fire-retarding materials with economically favorable means being available by way of the spray method or of an immersion method, which are advantageously already employed during production. At the same time, the mechanical stiffness of the structurally transparent thermal-insulating layer can be additionally increased by employing suitable finishing materials.

The transfer of the irradiated solar energy into the interior of the thermal-insulating layer by the radiation itself as well as by the thermal conduction of the converted radiation energy becomes possible into the material of the thermal-insulating layer based on the construction of the structurally transparent thermal-insulating layer to be protected.

A reflecting equipment of the thermal-insulating layer in the channels increases thereby the penetration depth of the radiation energy into the thermal-insulating layer and thereby improves the thermal feeding-in or decreases at least the thermal loss toward the outside substantially.

At the same time, the discharge of humidity is made possible through the capillary conductors and through diffusion in the air layer of the rear ventilation of the transparent covering of the integrated thermal-insulating arrangement, or is even further improved by porous covering plates or covering plates furnished with boreholes of a diffusion-open transparent covering based on an arrangement, where the structurally transparent thermal-insulating layer is resting solidly at the outer wall of the walling of a building.

Based on the increased temperature, reachable in this integrated thermal-insulating arrangement, in the region of the outer wall of the walling and of the masonry, the capillaries of the outer wall of the walling or of the masonry become dried out in the course of time and to the drawing-in of humidity from the ground is blocked, such that this integrated thermal-insulating arrangement can also be employed as an effective means for the drying of humid masonry.

Depending on the requirements of the thermal transfer or of the preferred removal of humidity from the masonry, the construction of the integrated thermal-insulating arrangement can be modified correspondingly.

In case where good thermal conduction between the covering and the outer wall of the walling of a building is most important, air slots between the wall elements are avoided.

In case the cooling of the outer wall of the walling is most important, a heat-exchanger layer is provided between the structurally transparent thermal-insulating layer and the outer wall of the walling, wherein the heat-exchanger layer is provided with heat-exchanger tubes or air channels, where the heat can be discharged through the heat-exchanger tubes or air channels by means of a liquid heat-exchanger agent, for example water, or by means of air.

According to this construction it is possible to accelerate the thermal transport into the interior of a building. This is particularly advantageously achieved when an interior-disposed heat-exchanger layer forms the interior delimiting wall of the interior wall of the walling, wherein heat-exchanger tubes for a liquid heat-exchanger agent or air channels are incorporated into the heat-exchanger layers. The interior wall of the walling with the heat-exchanger tubes or the air channels of the interior-disposed heat-exchanger layer are connected to the heat-exchanger tubes or the air channels of the heat-exchanger layer at the

outer wall of the walling to form a circulation, where the thermal transport can also occur in reverse in said circulation from the inside toward the outside.

An acceleration of the transfer of the irradiated solar energy becomes very effective in case of a thermal transfer with convection if air flows through the complete integrated thermal-insulating arrangement, where the air is led from the rear ventilation of the covering through the channels of the structurally transparent thermal-insulating layer and through channels or stones of the masonry into the interior-disposed air channels at the interior wall of the walling or, in case of a lack of the air channel, flows out immediately at the interior wall of the walling.

According to this construction, horizontally disposed, vertically perforated bricks can be employed as economically favorable wall elements, wherein the large surface of the channels in the structurally transparent thermal-insulating layer and in the stones of the masonry are available as a heat-exchanger surface.

The mechanical attachment of the structurally transparent thermal-insulating layer between a lath for structural work, where the transparent covering is applied to the outer side of said lath, and where the inner side of

said lath is attached to the outer wall of the walling of the building, results in an integrated thermal-insulating and thermal-collection arrangement which is constructed out of simple elements and is easy to produce.

The invention is described in the following by way of the drawing of several embodiments.

There is shown:

Fig. I. an integrated thermal-insulating and thermal-collection arrangement with a structurally transparent thermal-insulating layer, attached closely resting at a masonry, where the thermal-insulating layer is furnished on the outside with a transparent covering with a rear ventilation, in a sectional view,

Fig. II. an integrated thermal-insulating arrangement with transparent, diffusion-open covering immediately on the structurally transparent thermal-insulating layer, in a sectional view,

Fig. III. an integrated thermal-insulating arrangement according to Fig. I, where a heat-exchanger layer is inserted between the masonry and the structurally transparent thermal-insulating layer, in a sectional view,

Fig. IV. an integrated thermal-insulating arrangement according to Fig. III, wherein the heat-

exchanger layer is replaced by a variable rear ventilation slot, and wherein the structurally transparent thermal-insulating layer is disposed shiftable back and forth between the transparent covering on the outside and the masonry on the inside, in a sectional view,

Fig. V. an integrated thermal-insulating arrangement with a wall lath for structural work with an inserted structurally transparent thermal-insulating layer and a transparent covering of plates, which are applied with attachment profiles to the wall lath for structural work staggered in rows relative to each other, in an oblique view, partially in section,

Fig. VI. an integrated thermal-insulating arrangement according to Fig. V in section according to section lines A - B,

Fig. VII. an attachment profile for the plates of the transparent covering, in an oblique view,

Fig. VIII. an integrated thermal-insulating arrangement with a different wall lath for structural work with inserted structurally transparent thermal-insulating layer and a transparent covering of plates, which are attached with attachment hooks at the wall lath for structural work staggered in rows relative to each other, in

an oblique view, partially in section,

Fig. IX. an integrated thermal-insulating arrangement according to Fig. VIII, in section, according to section lines C - D,

Fig. X. an attachment hook for the plates of the transparent covering, in an oblique view,

Fig. XI. an integrated thermal-insulating arrangement with a masonry permeated by channels running from the outside to the inside, with a structurally transparent thermal-insulating layer closely adjoining to the outside, with a transparent covering with rear ventilation, and toward the inside with an interior-disposed air channel with an interior delimiting wall, in sectional view,

Fig. XII. a partial sectional view of the masonry according to Fig. XI, with stones with outwardly expanding channels and with an internal air channel, which is expanded to vertical partial channels and which is incorporated into the interior delimiting wall, in an oblique view and partially in section,

Fig. XIII. an integrated thermal-insulating arrangement according to Fig. III, with an additional interior heat-exchanger layer with heat-exchanger tubes or

air channels, which form an interior delimiting wall, in sectional view.

An integrated thermal-insulating and thermal-collection arrangement is illustrated in Fig. 1, where a masonry 11 represents an interior part of a wall of a building, where the interior side 18 of the building wall is formed by the interior wall 6 of the walling, and wherein the structurally thermal-insulating layer 5 is resting closely at the outer wall 10 of the walling of the masonry 11. This structurally transparent thermal-insulating layer 5 comprises thin, wavy sheets of thermal-insulating material, such as cardboard fibers, which are adhesively attached with planar intermediate sheets and form channels 26 running over the depth of the thermal-insulating layer 5, wherein the channels 26 are indicated in the illustration. This structurally transparent thermal-insulating layer 5 allows solar-energy radiation, which runs in the direction of the channels 26, to penetrate the depth of the channels 26, while the self-opacity of the thermal-insulating layer 5 rises very quickly based on an increasing angle relative to the direction of the channels 26.

This structurally transparent thermal-insulating layer 5 is closed toward the outer side 1 by a transparent

covering 2 and is separated from the transparent covering 2 by a rear ventilation 4 in the form of an air slot, where an air stream can be led through the air slot for the cooling of the thermal-insulating arrangement.

The channels 26 of the structurally transparent thermal-insulating layer 5 exhibit a small diameter in comparison to the depth of the thermal-insulating layer 5 such that the irradiated solar energy, in case of an "average" position of the sun, is already absorbed in the outer region of the structurally transparent insulating layer 5, from where the thermal transport by thermal conduction is then performed through the thermal-insulating layer.

In case of a low position of the sun, the irradiated solar energy thereby reaches deeper into the structurally transparent thermal-insulating layer 5 before it is absorbed and, in the most favorable case, up to the outer wall 10 of the walling.

In case of an undesirably high thermal irradiation, as it can occur at the West side and at the East side of buildings, the channels 26 of the structurally transparent thermal-insulating layer are produced running downwardly at an angle (not illustrated), whereby the self-opacity relative to the irradiated solar energy is substantially

increased.

According to the integrated thermal-insulating and thermal-collection arrangement illustrated in Fig. II., the structurally thermal-insulating layer 5 closes off at the outer side 1 with a diffusion-open transparent covering 3, for example made of water-repellent fiber fleece, such as finished corrugated cardboard, which is disposed sealingly resting.

The structurally transparent thermal-insulating layer 5 is soaked with fire-retarding solutions of water glass, boron salt or phosphate and with biocidic agents against fungi and insect infestation and dried.

In order to be able to discharge the solar thermal energy led to the outer wall 10 of the walling in case of excess, a heat-exchanger layer is inserted between the structurally transparent thermal-insulating layer 5 and the outer wall 10 of the walling, as illustrated in Fig. III., where heat-exchanger tubes or air channels 27 are provided in the heat-exchanger layer, wherein the heat-exchanger medium, for example water or air, leads the excessive heat away.

Since the requirements of the thermal insulation change considerably as a function of the outside temperature

and the irradiation of solar energy, an embodiment is shown in Fig. IV. of the integrated thermal-insulating and thermal-collection arrangement, where a rear ventilation 4 is provided between the transparent covering 2 at the outer side 1 and a spatially variable, structurally transparent thermal-insulating layer 7, which corresponds in its structure to the thermal-insulating layer 5, and a variable rear ventilation slot 8 is furnished between the structurally transparent thermal-insulating layer 7 and the outer wall 10 of the walling.

By shifting the spatially variable, structurally transparent thermal-insulating layer 7, either the rear ventilation 4 or the rear ventilation slot 8 can thereby be increased or decreased, depending if the thermal discharge is to occur immediately behind the transparent covering 2 or in front of the outer wall 10 of the walling or, alternatively, at both sites of the wall construction.

The structurally transparent thermal-insulating layer 5 can be employed between the counter lath system 21 for structural work, attached to the outer wall 10 of the walling and made of lath disposed vertically, wherein the counter lath system 21 is nailed with horizontal attachment profile supports and attachment hook supports 20, wherein

attachment profiles 23 for the plates 28, 28' of the transparent covering 2 are nailed to or, respectively, hung in the horizontal attachment profile supports and attachment hook supports 20, and wherein the plates 28, 28' of the covering 2 are inserted into the attachment profiles 23 and are held at the top and at the bottom.

The stacks of plates are thereby layed over the attachment profiles, such that running-off rain water can flow off over the outer side 29 of an attachment profile 23 downwardly onto the next plate 28' (Fig. V. - VII.).

In case of a modified way of attachment, as it is illustrated in Figs. VII. - IX., the horizontal cross lath system 22 is attached to the outer wall 10 of the walling, where the structurally transparent thermal-insulating layer 5 is inserted between the horizontal cross lath 22.

This cross lath system 22 is furnished with a vertical support lath 24 for the transparent covering 2, into which mill-outs 33 are incorporated, into which mill-outs 33 the attachment hooks 25 for the plates 28, 28' of the transparent covering 2 are hooked, wherein these plates are placed into hook parts of the attachment hooks 25, where the hook parts are bent toward the outside and upwardly, while the plates are held at their upper end in a covered

way by the hook body.

The stacks of the plates 28, 28' are placed thereby at the front side 34 of the attachment hooks such that rain water, penetrating there, runs off to the next lower row of the plates.

The plates 28, 28' of the covering comprise a glass with granulated and corned outer surface in order to avoid reflections in the outer region.

In order to increase the transferred thermal output, the convection of the air can be employed, as is illustrated in Figs. XI. and XII.

An arrangement according to Fig. I. is the starting point of Fig. XI., wherein the structurally transparent thermal-insulating layer 5 is resting solidly at the outer wall 10 of the walling. A masonry 12 is employed made of horizontal, wall-open-placed, vertically perforated bricks, where the holes 30 of the bricks pass through the wall. An interior disposed air channel 14 is generated at the interior wall 6 of the walling by an interior delimiting wall 15, placed in front of and at a distance from the interior wall 6 of the walling.

For heating the building, an air stream 19 from the rear ventilation 4 of the transparent covering 4 can flow

through the channels 26 of the structurally transparent thermal-insulating layer 5, while simultaneously receiving the irradiated heat, and the air stream 19 passes through the holes 30 of the masonry 12 into the interior-disposed air channel 14, where the air stream 19 streams upwardly into the building.

In a similar way, it is possible to produce the cooling of the building in that an air stream 19 from a cool region of the building, for example, the basement region, is lead through the building wall by way of convection or artificial transport means into the interior of the building.

In order to form the air stream 19 more favorably, a masonry 13, made of horizontal, wall-open-placed vertically perforated bricks, can be employed, where the inner diameter of the holes 31 of the brick increases toward the outer wall 10 of the walling, as illustrated in Fig. XII.

In order to improve the guiding of the stream of the air stream 19 in the interior-disposed air channel 14, the air channel 14 is expanded with vertically running partial channels, which are incorporated into the interior delimiting wall 16.

In order to increase the thermal transfer between

the outer side 1 and the interior side 18 of a building, according to an arrangement according to Fig. III, an interior-disposed air channel 14 can be produced by an interior delimiting wall 16, wherein heat-exchanger tubes 32 are disposed on top of each other in the air channel 14, wherein the thermal medium of the heat-exchanger tubes 32 can feed or discharge, and wherein the heat exchanger tubes 32 are connected to the heat-exchanger tubes 27 of the heat-exchanger layer 9 at the outer wall 10 of the walling to form a circulation (Fig. XIII.).

Legend

- 1 outer side
- 2 transparent covering
- 3 diffusion-open, transparent covering
- 4 rear ventilation, behind the transparent covering 2
- 5 structurally transparent thermal-insulating layer
- 6 interior wall of the walling
- 7 spatially variable, structurally transparent thermal-insulating layer
- 8 variable rear ventilation slot
- 9 heat-exchanger layer, at the outer wall 10 of the walling
- 10 outer wall of the walling
- 11 masonry
- 12 masonry, made of horizontal, wall-open-placed vertically perforated bricks
- 13 masonry, made of horizontal, wall-open-placed vertically perforated bricks with particular hole shape
- 14 interior-disposed air channel
- 15 interior delimiting wall
- 16 interior delimiting wall, with incorporated partial channels of the interior-disposed air channel 14

- 17 heat-exchanger layer at the interior wall 6 of the walling
- 18 interior side
- 19 air stream
- 20 attachment profile support and attachment hook support
- 21 counter lath system for structural work
- 22 cross lath system for structural work
- 23 attachment profile
- 24 support lath for structural work
- 25 attachment hooks
- 26 channels for structurally transparent thermal-insulating layer
- 27 heat-exchanger tubes or air channels in the heat-exchanger layer 9
- 28, 28' plates of the transparent covering 2 in rows disposed one above the other
- 29 outer side of the attachment profile 23
- 30 holes of the vertically perforated bricks of the masonry 12
- 31 holes of the vertically perforated bricks of the masonry 13, having an increasing diameter toward the outer wall 10 of the walling

32 heat exchanger tubes in the interior heat-exchanger
layer 17, at the interior wall 6 of the walling
33 mill-out in the support lath for structural work
34 outer side of the attachment hook 25

CLAIMS:

1. Integrated thermal-insulating arrangement, in particular for the outer walls or roofs of buildings, with at least one solar-energy transparent thermal-insulating layer, which is constructed as a structurally transparent insulating layer, and which comprises an insulating material made of a plurality of side-by-side disposed channels, at least nearly parallel-directed to the thermal stream, characterized in that the solar-energy transparent thermal-insulating layer forms a structurally transparent thermal-insulating layer, produced of elements which are thin in relation to the layer thickness of the solar-energy transparent thermal-insulating layer, wherein open channels, running through the thermal-insulating layer, exhibit substantially uniform diameters, wherein the channels, formed in the structurally transparent insulating layer, exhibit a diameter which is small in relation to the thickness of the insulating layer and which is at the most one tenth of the thickness of the insulating layer and which is substantially of equal size in all channels.
2. The integrated thermal-insulating arrangement according to claim 1, wherein the structurally transparent insulating layer is formed of sheets, each sheet forming a layer, the insulating layer being generated by the sheets which are wave-shaped and run back and forth between the delimitations of the insulating layer, wherein the individual layers are welded or adhesively attached to each other so that the individual layers leave open channels running through the thermal-insulating layer.
3. The integrated thermal-insulating arrangement according to claim 1 or 2, wherein planar sheets are welded or adhesively attached in the structurally transparent insulating layer between the back-and-forth running wave-shaped sheets.
4. The integrated thermal-insulating arrangement according to any one of claims 1 - 3, wherein the structurally transparent insulating layer is produced

of fibers, in particular of cardboard fibers, wherein capillary conduction of humidity from the inside, from the outer wall of the walling, and the discharge through diffusion is maintained.

5. The integrated thermal-insulating arrangement according to any one of claims 1 - 4, wherein the structurally transparent insulating layer is produced of wave-shaped corrugated cardboard, wherein the spatial structure, in particular of a corrugated cardboard-honeycomb, is present substantially such as it is employed in the carpentry business for filling closed hollow spaces.

6. The integrated thermal-insulating arrangement according to any one of claims 1 - 5, wherein the structurally transparent insulating layer is produced of corrugated cardboard, in particular of a corrugated cardboard honeycomb, which is soaked in an immersion method for inking with color pigments or for fire-retardation with fire-retarding chemicals, in particular with water glass, boron salt solutions or the like, and is sprayed with biocidic agents.

7. The integrated thermal-insulating arrangement according to any one of claims 1 - 6, wherein the channels, disposed in the structurally transparent insulating layer, are disposed at least slightly inclined relative to the surface of the insulating layer and are directed running outwardly toward the outer side and downwardly upon placement at a wall of a building, in particular at an outer wall of the walling.

8. The integrated thermal-insulating arrangement according to any one of claims 1 - 7, wherein the structurally transparent insulating layer transfers thermal energy both through sheets formed by the channels as well as by way of radiation in the channels between the inside, in particular of the outer wall of the walling, and the outer side, and vice versa, wherein the channels are covered by a reflecting metal coating, in particular in their outer part.

9. The integrated thermal-insulating arrangement according to any one of

claims 1 - 8, wherein the structurally transparent insulating layer is furnished on the outer side with a transparent covering, which leaves open a rear ventilation toward the structurally transparent insulating layer.

10. The integrated thermal-insulating arrangement according to any one of claims 1 - 9, wherein the structurally transparent insulating layer is applied sealingly toward the inside, in particular at the outer wall of the walling, and sealingly toward the outside at the transparent covering.

11. The integrated thermal-insulating arrangement according to any one of claims 1 - 10, wherein a heat-exchanger layer is disposed between the structurally transparent insulating layer toward the inside, in particular of the outer wall of the walling, wherein the heat-exchanger layer is furnished with heat exchanger tubes or air channels.

12. The integrated thermal-insulating arrangement according to any one of claims 1 - 11, wherein the structurally transparent insulating layer is shiftably applied between the transparent cover toward the outside in the rear ventilation, and toward the inside, in particular toward the outer wall of the walling, in a variable rear ventilation slot.

13. The integrated thermal-insulating arrangement according to any one of claims 1 - 12, wherein the transparent covering is formed of plates, which are furnished outside with an uneven surface structure at the outside of the integrated thermal-insulating arrangement in the form of a glass having a granulated and corned outer surface, such as employed for avoiding an outer reflecting effect.

14. The integrated thermal-insulating arrangement according to any one of claims 1 - 13, wherein the structurally transparent insulating layer is furnished with a diffusion-open transparent covering, wherein the transparent covering comprises a material furnished with pores or a water-repellent material.

15. The integrated thermal-insulating arrangement according to any one of claims 1 - 14, wherein the structurally transparent insulating layer adjoins in an open way to the outer wall of the walling of a masonry made of stones with holes passing through the stones made of wall-open, horizontally placed, vertically perforated bricks, wherein an interior delimiting wall, forming an interior disposed air channel, is disposed at a distance, at the interior wall of the walling of the masonry, wherein the interior delimiting wall is formed in particular of side-by-side disposed, vertically running partial channels.

16. The integrated thermal-insulating arrangement according to any one of claims 1 - 15, wherein a masonry is composed of stones, wherein horizontally placed holes of the stones at the outer wall of the walling exhibit a larger diameter as compared to the interior wall of the walling.

17. The integrated thermal-insulating arrangement according to any one of claims 1 - 16, wherein an interior disposed heat-exchanger layer is arranged at the interior wall of the walling, wherein the heat exchanger tubes or air channels are incorporated in the heat-exchanger layer, and wherein the heat exchanger tubes or air channels are connected to the heat-exchanger tubes or air channels of the heat-exchanger layer at the outer wall of the walling to form a circulation.

18. The integrated thermal-insulating arrangement according to any one of claims 1 - 17, wherein the structurally transparent insulating layer is disposed between a vertically disposed counter lath system or a horizontally disposed cross lath system, which are attached at the outer wall of the walling, wherein the counter lath system is furnished with horizontal attachment profiles and attachment hook supports, and wherein the cross lath system is furnished with a vertical support lath, which support the attachment profiles or, respectively, the attachment hooks for the transparent covering or the diffusion-open covering, and which comprise plates, which are disposed in rows and staggered relative to each other.

Fig. I

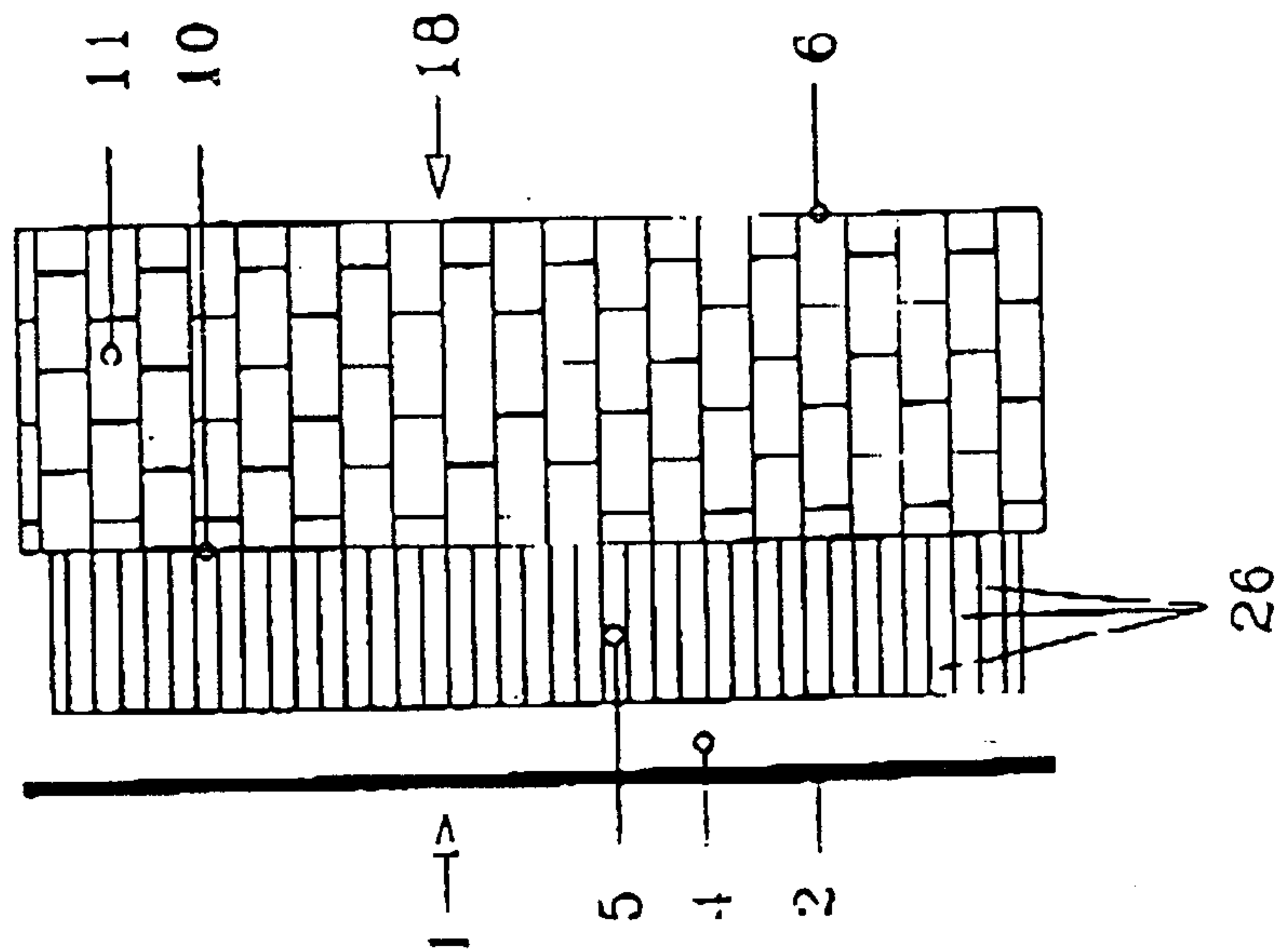


Fig. II

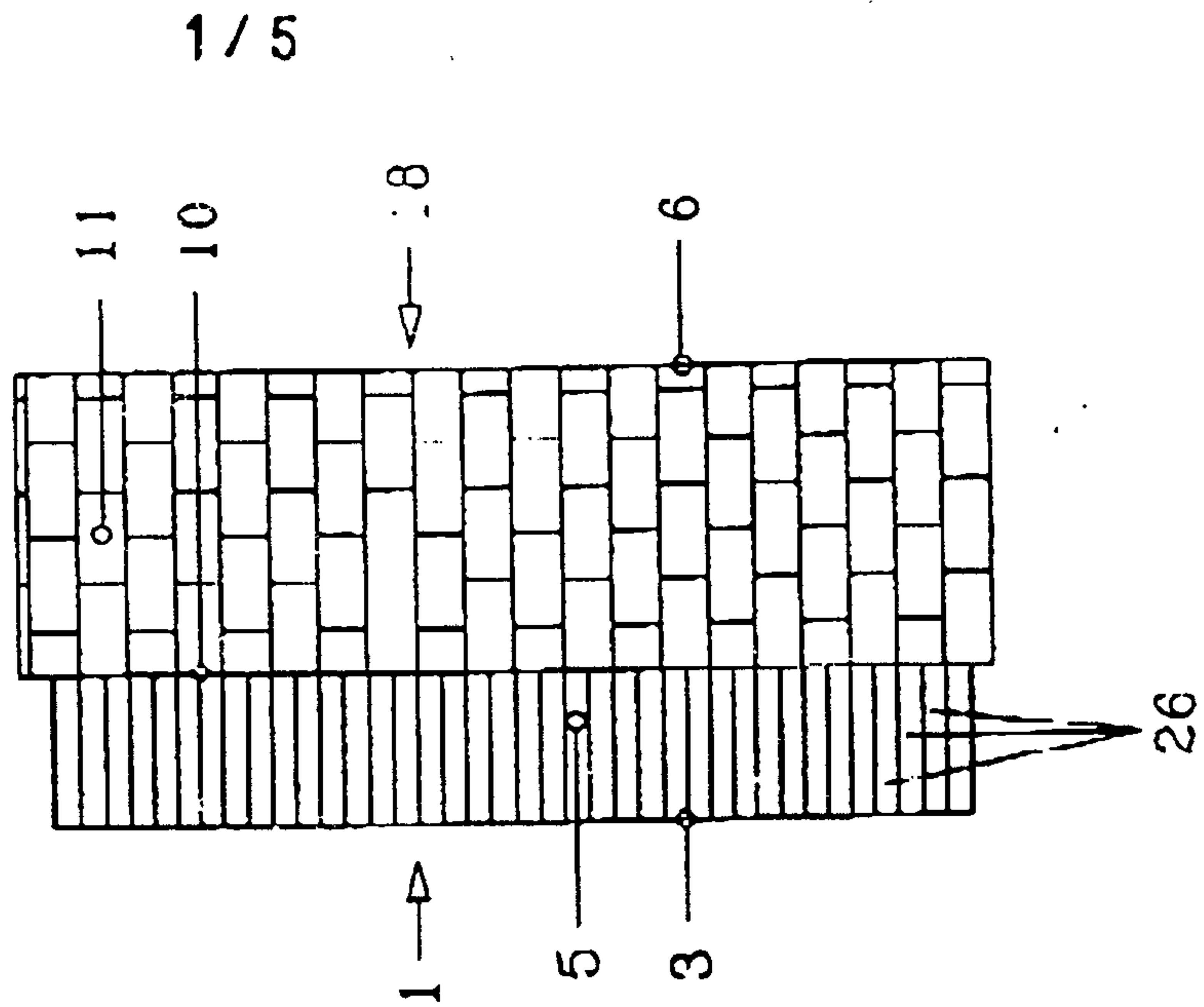


Fig.IV

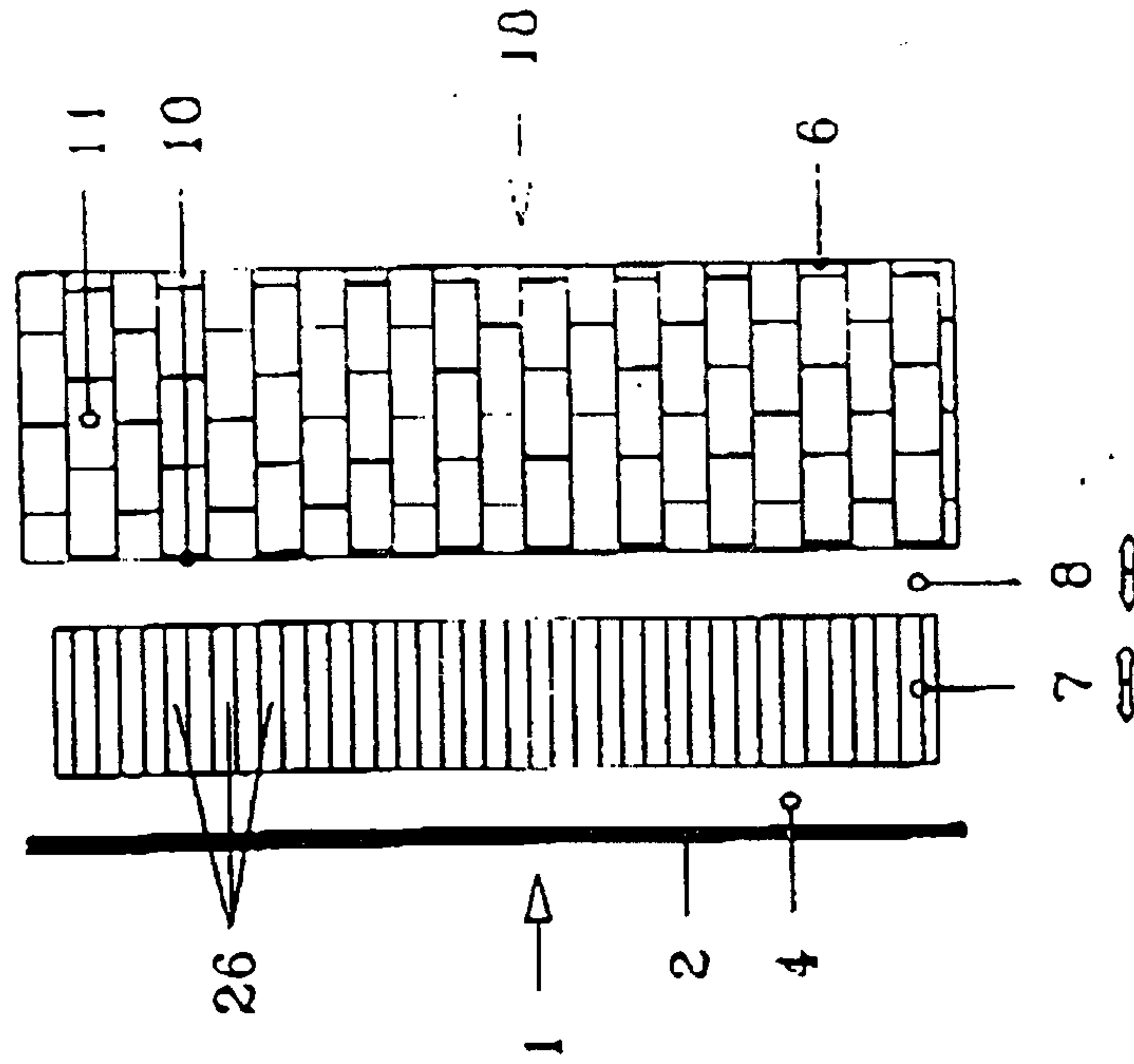
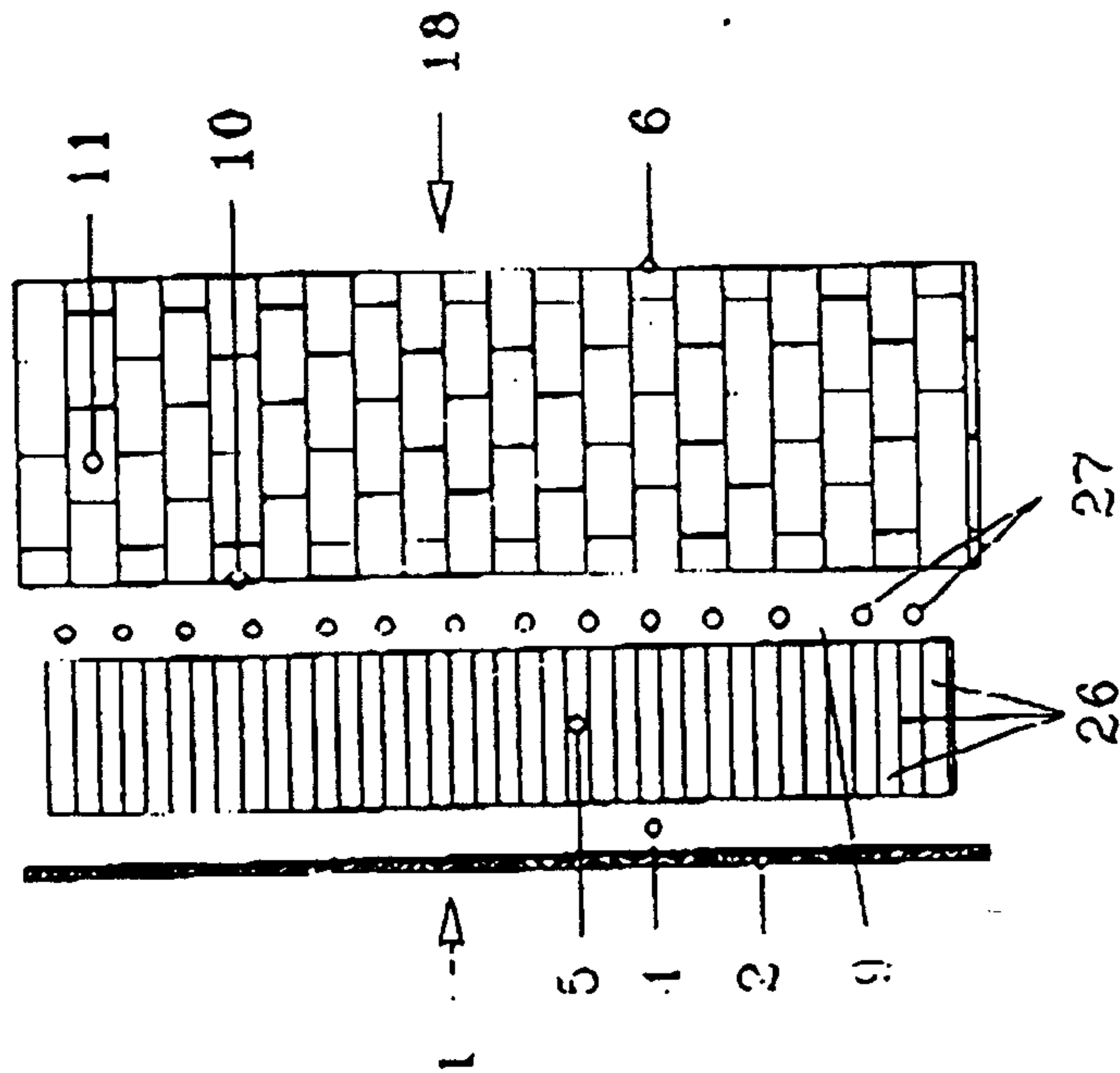
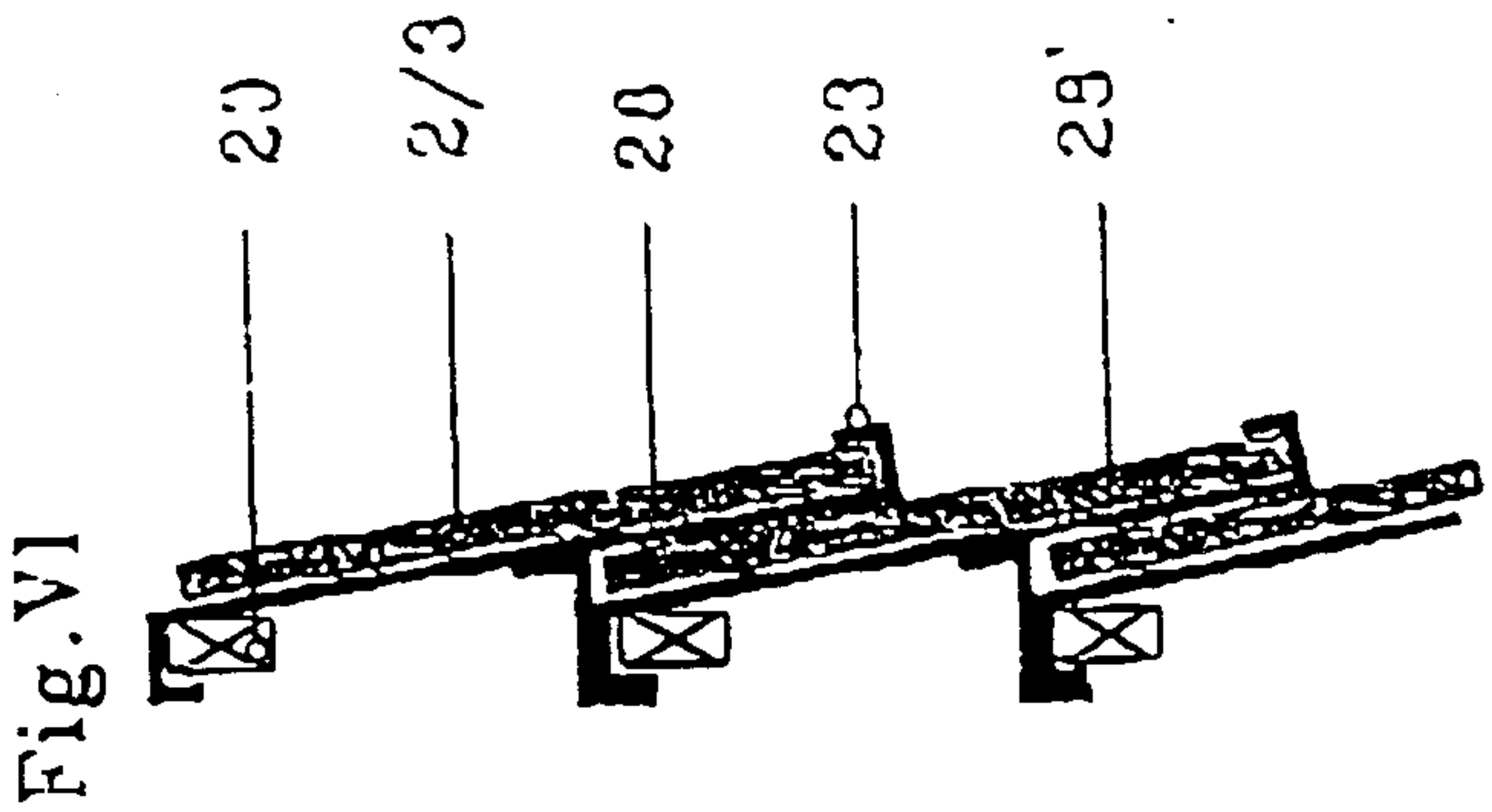
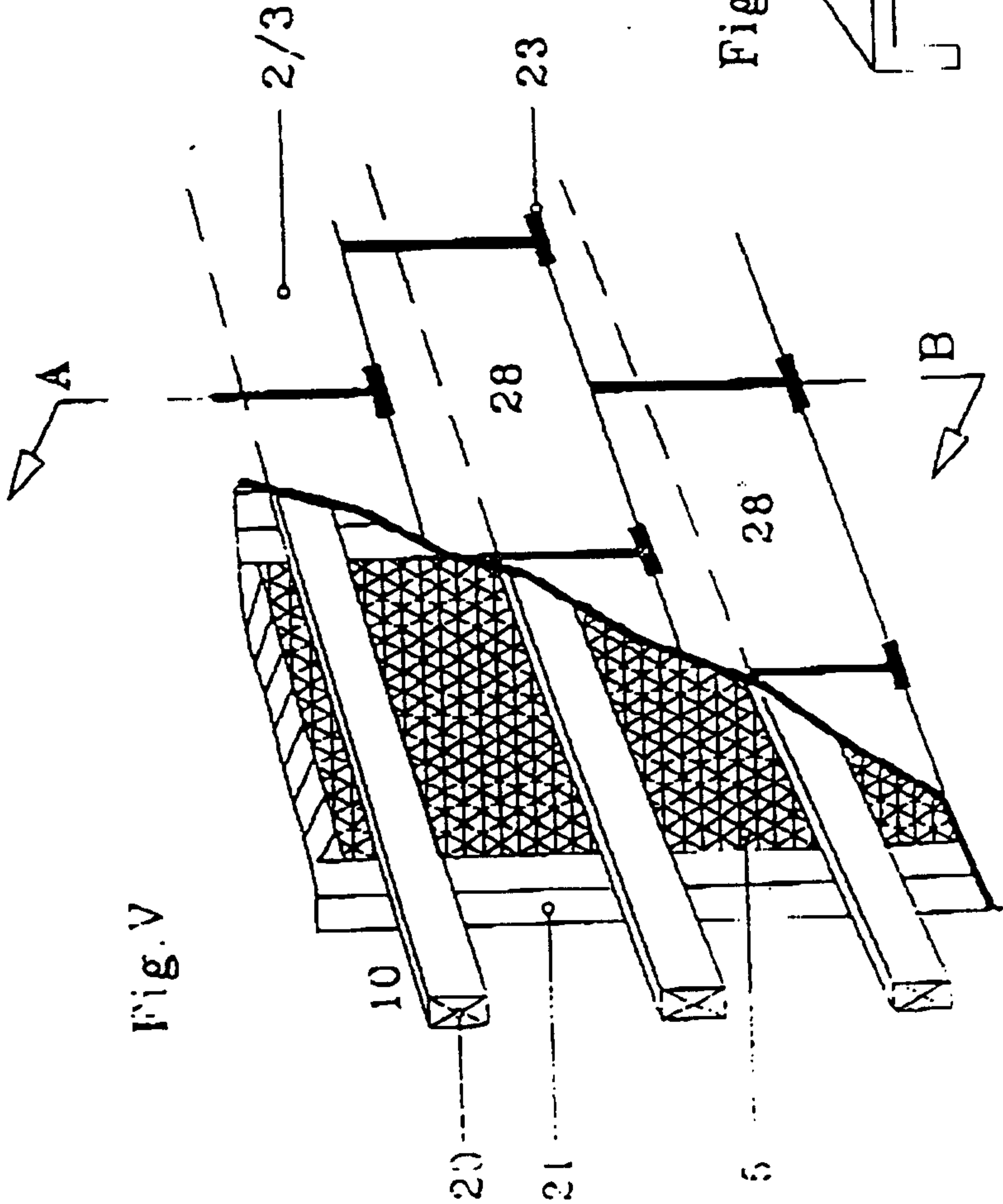
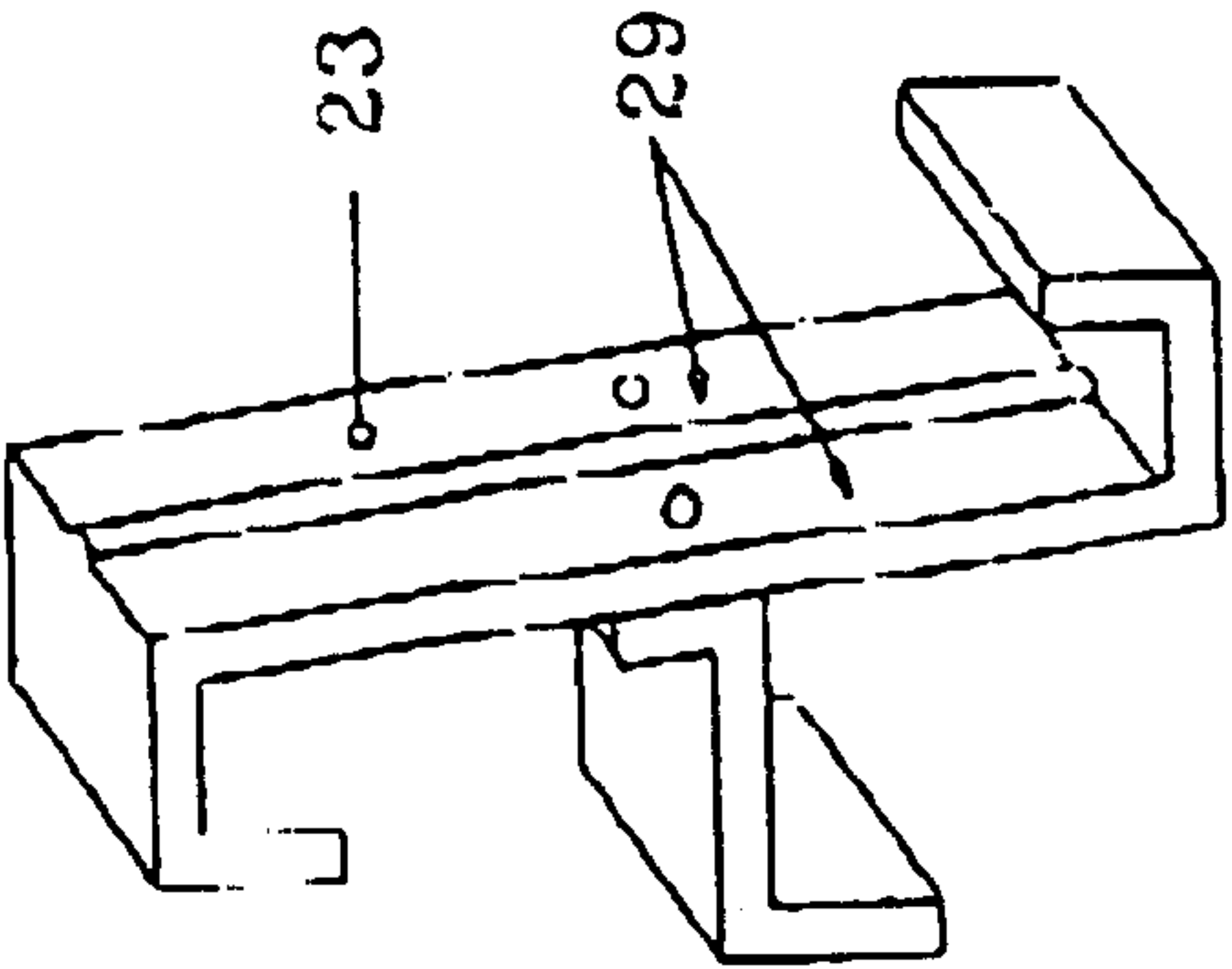


Fig.III





Schnitt nach A-B



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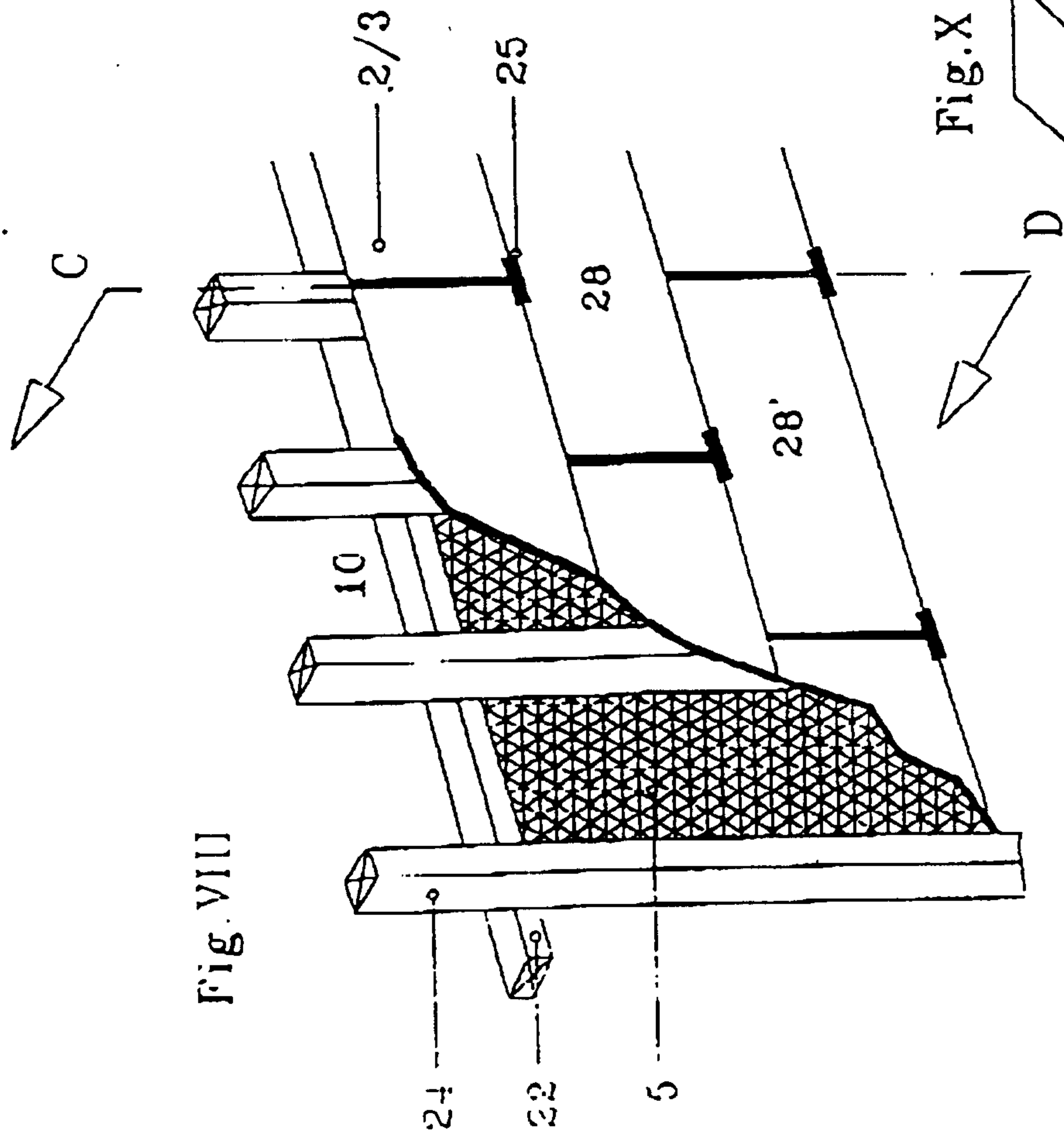


Fig. VIII

Fig. IX

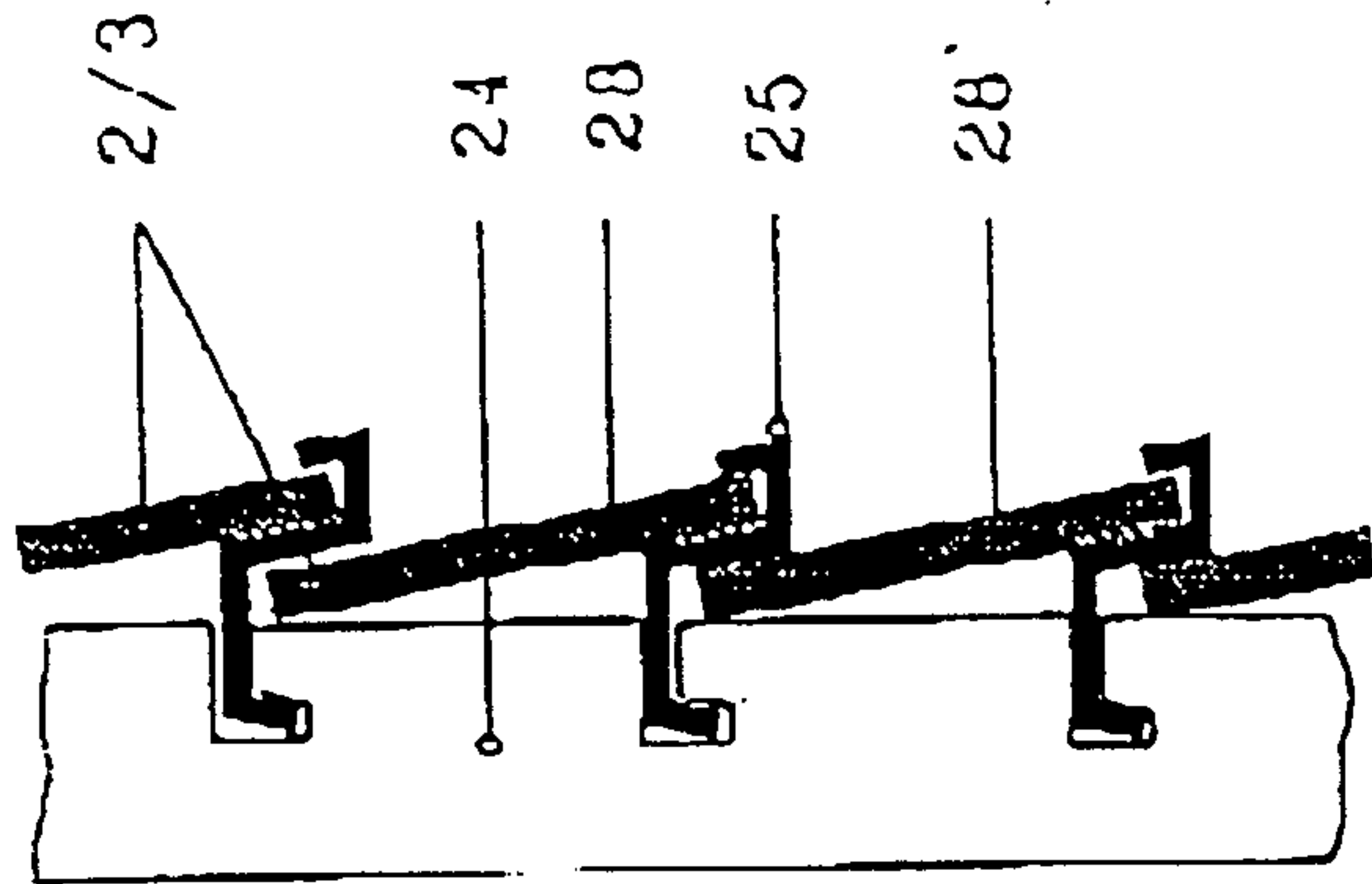
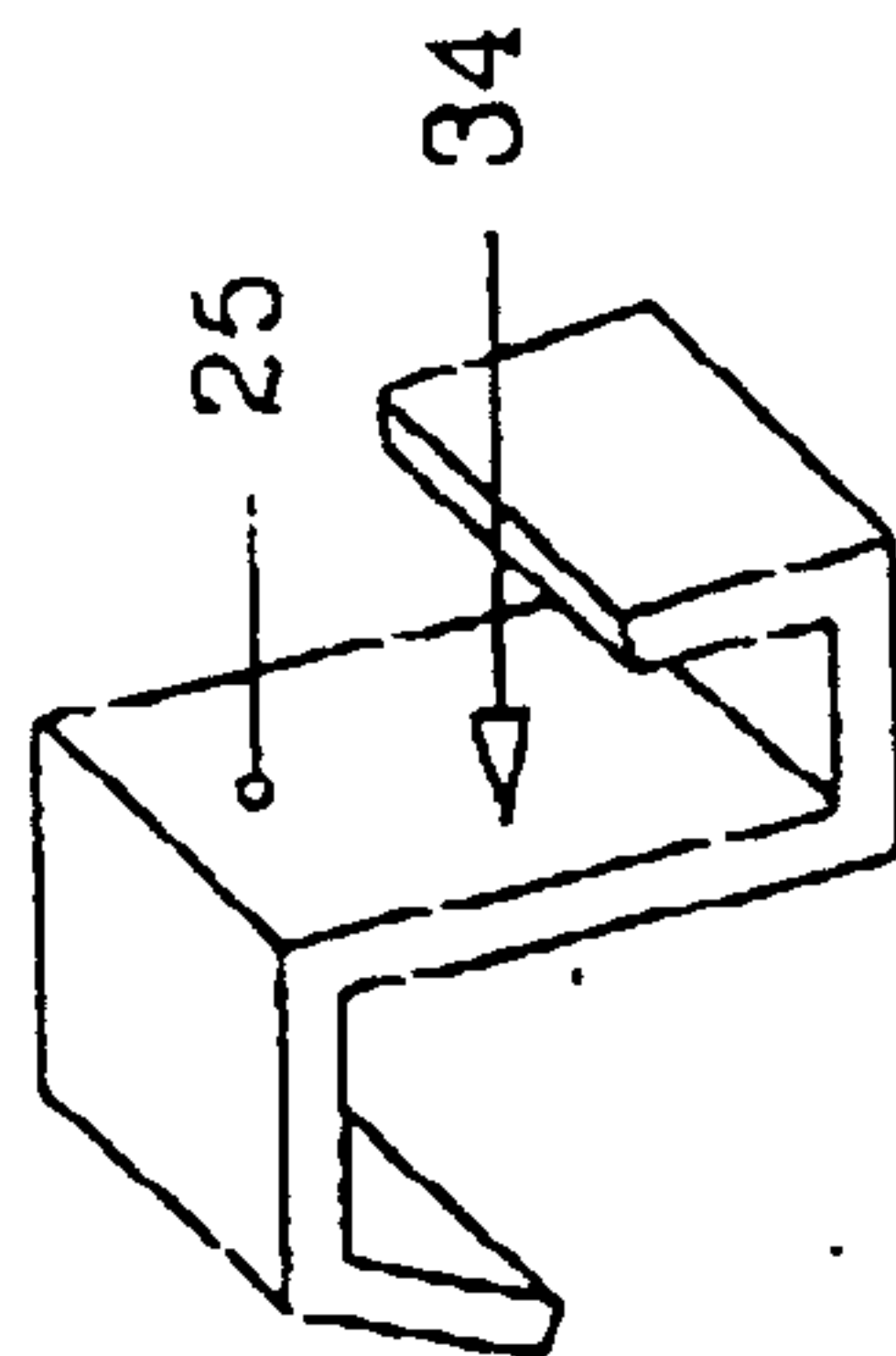


Fig. X



Schnitt nach C-D

Fig. XIII

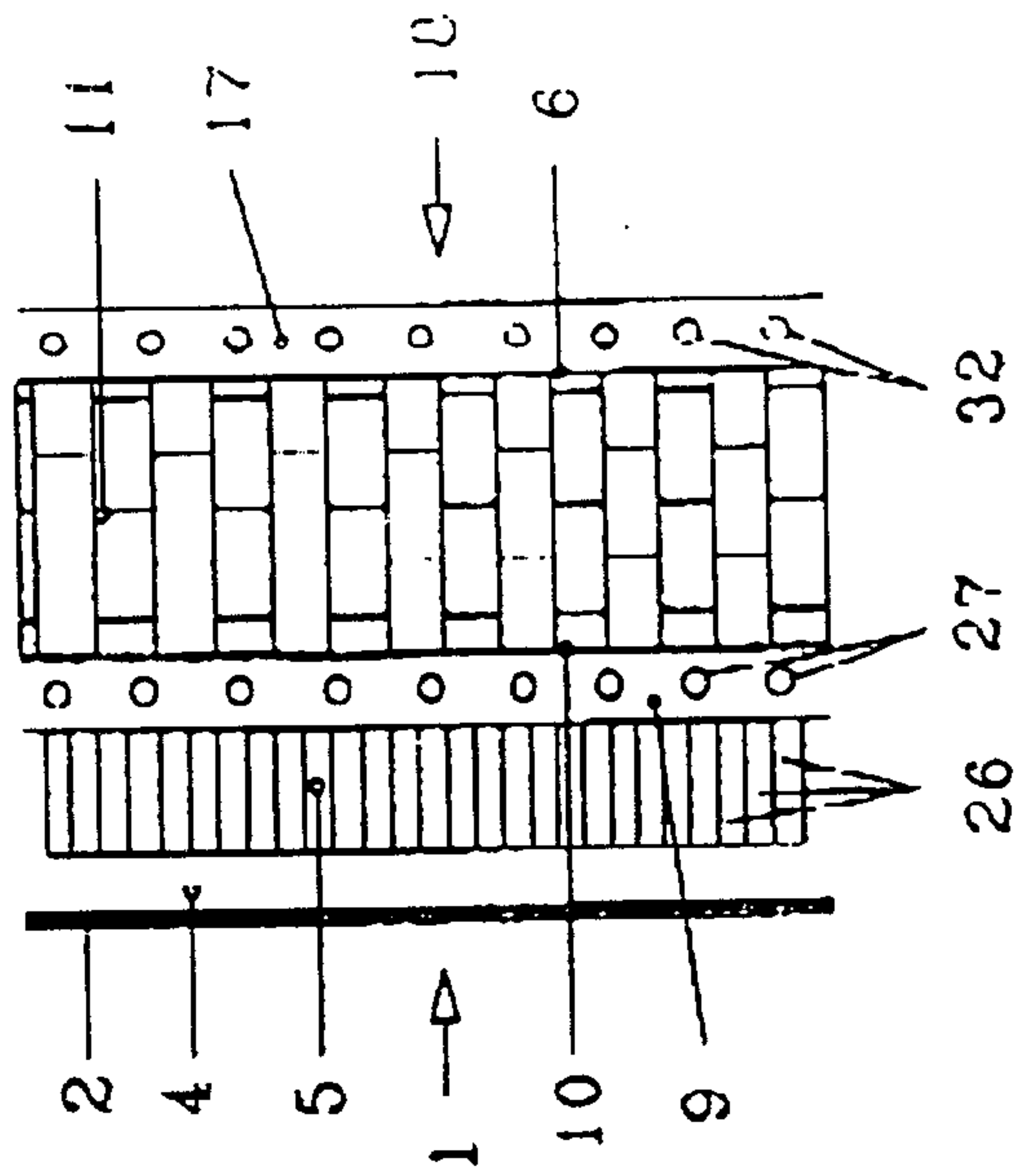


Fig. XII

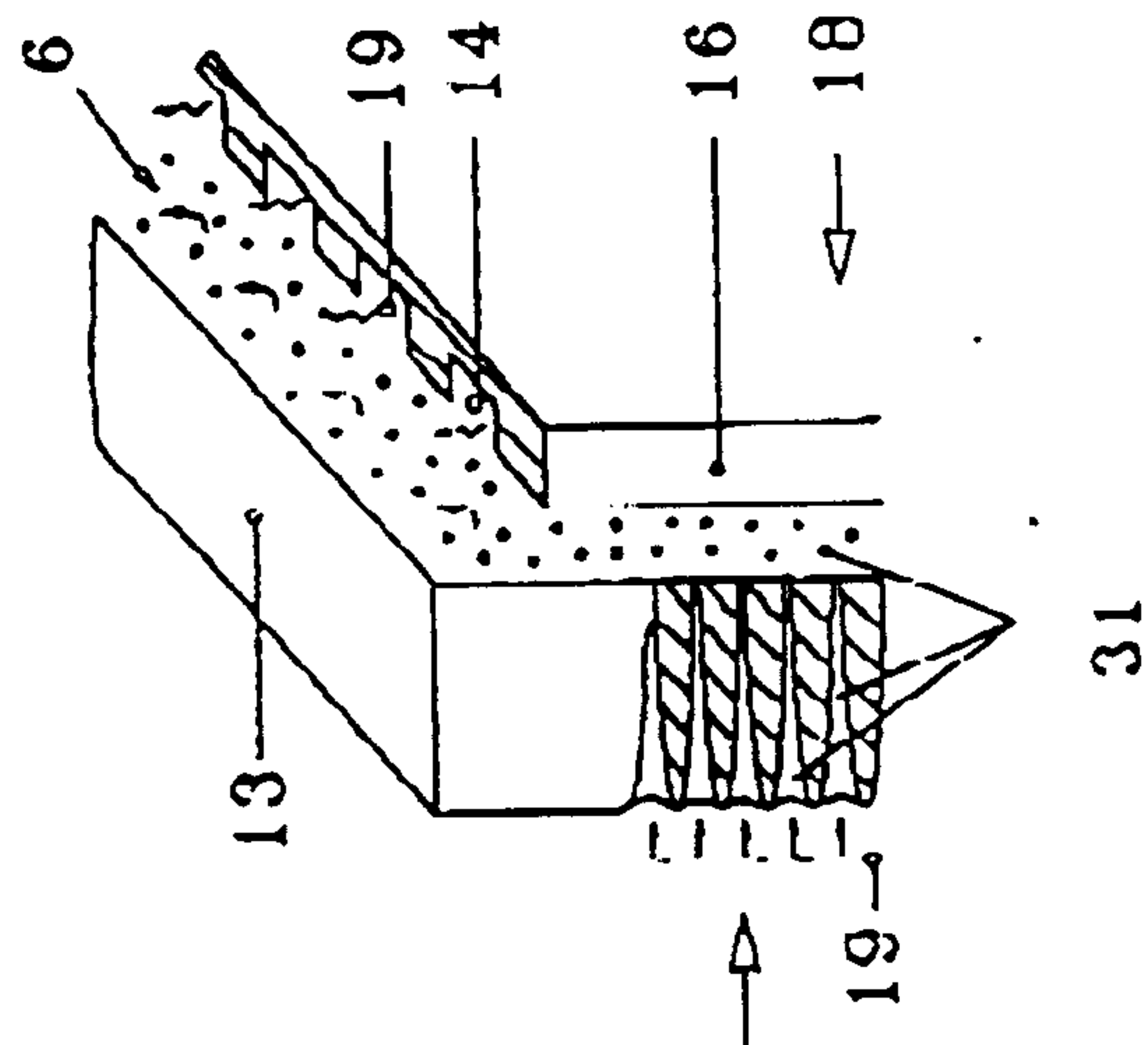


Fig. 21

