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[54] **METHOD OF FORMING A CEILING COVER
 STRUCTURE OF SWELLABLE PLASTIC
 SHEETING**
 5 Claims, No Drawings

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ABSTRACT: For covering a ceiling of a room there is used an integral cover composed of sheets, bound together at their edges, of swellable plastic or rubber sheeting. Prior to being erected in position the plastic sheeting is treated with a swelling agent; the excess is drained off subsequent to the material swelling, whereafter the sheeting after being swollen to an increase in size of at least 2 percent, is erected by means of conventional mechanical attachment means as a ceiling cover structure and the swelling agent caused to evaporate totally, whereupon the sheeting contracts and obtains a flat, stretched surface.

METHOD OF FORMING A CEILING COVER STRUCTURE OF SWELLABLE PLASTIC SHEETING

The present invention is concerned with the stretching of ceiling cover structures and with a plastic or rubber sheeting intended to form said structure.

In recent years the methods by which ceiling structures are erected have been considerably simplified by the use of modern materials. Instead of the earlier ceiling structures of plaster of Paris or stretched fabric or ceiling paper, the simplified structures merely comprise a stretched sheet of white matted PVC-material; this type of ceiling structure being particularly used in residential buildings. The erection of such ceiling structures, however, is accompanied by the problem of being able to stretch or tension the ceiling sufficiently when erecting the same without an unrationally high labor contribution. If the ceiling sheeting is insufficiently stretched, it will present irregularities in the surface thereof and sag in the center. In some instances, the ceiling may not begin to sag until some time has elapsed. Ceiling tensioning methods employed hitherto all entail mechanical stretching of said ceiling cover structure whilst it is being erected.

The present invention is intended to circumvent the aforementioned disadvantages without increasing the contribution of manual labor, which is only called upon during the actual process of erecting the ceiling structure; wherein the actual stretching or tensioning of the sheeting is simplified, while at the same time the end result is improved and a safer structure obtained. The task of stretching the sheeting manually is rendered essentially unnecessary.

In the present invention, these advantages are obtained by treating the plastic sheeting with a swelling agent before placing it in position, excess swelling agent being allowed to drain away subsequent to the sheet swelling, after which the swollen sheeting is erected as a ceiling structure or cover in a room by means of conventional mechanical fastening or mounting means, with or without stretching. The swelling agent is then allowed to evaporate completely, whereupon the erected and fixed sheeting shrinks, to provide for a flat, smoothed surface and permanent stretch of the sheeting.

The sheeting used is smaller in an unswollen condition than the ceiling area which it is intended to cover. In practice good results have been obtained with sheeting, which in an unswollen condition was 2-20 percent smaller than the intended ceiling area. The actual percental difference in areas of the sheeting in relation to ceiling area varies, however, in dependence on the plastic material in the sheeting. It is advantageous to choose a size which, when the sheeting is in a swollen condition, corresponds at least essentially in size to the intended ceiling area. In this way the manual labor required to erect the ceiling is reduced, since the requirement of complete stretching is obviated.

Since the sheeting is often brittle and may be damaged by the mechanical securing or attachment means, it has been found expedient to provide the sheeting with suitably designed edge reinforcement portions placed around the periphery thereof, bearing in mind the aforementioned conditions concerning size; said reinforcing portions, for instance, being in the form of fabric or wire reinforced strip or tape portions, suitably provided with edge beading or thickened edges or the like to facilitate attachment of the sheeting at the side portions of the ceiling structure by, for instance, bonding and/or nailing, or by inserting said portions through a slot or attachment means of some other design.

Under certain conditions, for instance when using a curable plastic or rubber sheeting, it is to advantage to increase the resistance of the sheeting by curing said sheeting either before, during or subsequent to erecting said sheeting in the form of a ceiling cover structure. The sheeting is suitably treated with a curing agent which has a delayed action, whereby curing of the sheeting will take place subsequent to the stretching thereof and after total evaporation of the swollen agent.

The sheeting is conveniently erected at at the same time as the usual ceiling joists are placed in position.

When it is considered unsuitable or unexpedient to apply the swelling agent to the sheeting at the working site before erecting the ceiling cover structure, the said swelling agent may be applied at some other location, the consumer disclosing to the manufacturer the desired size of the sheeting and obtaining therefrom pretreated sheeting in swollen condition. Subsequent to swelling of the plastic or rubber sheeting and drainage of excess swelling agent, the sheeting is packed to prevent total evaporation of the swelling agent, which remains impregnated in the sheeting before the ceiling cover structure is erected. This can be effected by packing the sheeting in polyethylene bags for instance. To prevent the contacting surfaces of the swollen sheeting from sticking together when said sheeting is folded or rolled, an intermediate layer of some suitable material such as sheets of polyethylene are placed between said contacting surfaces, the said intermediate sheets being removed when the ceiling cover structure is erected.

The invention is also concerned with plastic or rubber sheetings for use when putting the method into effect, comprising cut sheets of material treated with a swelling agent and conveniently provided with the aforementioned edge reinforcements.

The invention will now be further illustrated with reference to a number of examples.

EXAMPLE 1

White, matted sheets of PVC containing 25 percent plasticizer and produced in running lengths 1.5 meters wide are welded together to form one single piece, presenting a surface of 4.5x6.3 m. The edges of the sheeting are then stretched to a length of 5 and 7 m. respectively, corresponding to the ceiling surface which the ceiling structure is to cover. The edges are then welded together with strips of polyester fabric reinforced PVC material having a width of 3 cm. The ceiling structure is then completely immersed in a mixture of 80 percent odorless paraffin and 20 percent ethyloxalate and allowed to swell, the surface of the sheeting being at least equal to the surface of the ceiling, i.e. in this instance 5x7 m. The sheeting is then removed from the bath and excess swelling solution drained off. The ceiling structure may then be rolled up and packed in a polyethylene bag to prevent further departure of the swelling agent by evaporation, for instance. Obviously, the choice of polyethylene is purely arbitrary since any material capable of fulfilling the intended function can be used in its stead. To prevent the contacting surfaces of the sheeting from sticking together when said sheeting is rolled up or folded, a sheet of some suitable material such as polyethylene may be placed on said sheeting and the sheeting rolled up together with said sheet of polyethylene. The packed, swollen sheeting can then be sent to the working site where it is erected in the aforementioned manner, by nailing, etc.

EXAMPLE 2

White, matted PVC-sheet, containing 35 percent acrylonitrilbutadienemethacrylic polymer as a plasticizer and produced in running lengths 1.5 m. in width are welded together to form a single piece 6x8.5 m. in area. The edges are stretched to 7 and 10 m. in length and welded together with strips of 3 cm. wide polyester fabric reinforced PVC material. The ceiling cover structure is then completely immersed in a mixture of 78 percent odorless paraffin, 20 percent ethyloxalate and 2 percent diphenylmethanediisocyanate. The sheeting is removed from the bath and the surplus solution drained off, and said sheeting then rolled up and packed so that the swelling solution cannot evaporate. The process is then the same as that disclosed in example 1. The isocyanate reacts during the course of some days with the methacrylic acid groups and provides a cross-linking or vulcanization of the acrylnitrilebutadienemethacrylic rubber. The sheeting in this way obtains considerably improved dimension stability, which contributes towards a better retention of good stretching and flatness of the ceiling than in the case of normal

PVC sheeting. As a result of cold flow, after a while normal PVC-sheeting shows a certain tendency to sag, even though it has been well stretched when erected.

EXAMPLE 3

White, matted butyl-rubber/polychloroprene, manufactured in running lengths 1.5 m. wide are welded together to form a single sheet 5.4x7.2 m. in size. The edges are stretched to a length of 6 and 8 m. respectively, and welded together with 3 cm. wide strips of butyl rubber impregnated fabric produced from a synthetic polyester textile fiber based on terephthalic acid. The process then continues as illustrated in example 2. The sheeting is also cured in this instance by the mixed curing agents and thereby also obtains a better dimension stability than normal PVC-sheeting. It is also possible to use sheeting made of other types of rubber, the swelling solution being added with a curing agent, which will vulcanize the sheeting. It is also possible to cure the rubber sheeting before it is treated with the swelling solution.

Thus, the sheeting used as a ceiling cover structure may comprise other polymeric materials than PVC. Examples of such materials are synthetic rubber (polychloropropene, butadiene polymers and copolymers, EP-rubber, acrylate rubber and butyl rubber, urethane rubber etc.), polyvinyl butyral, polyacrylates etc.

What I claim is:

1. A method of stretching ceiling cover structures comprising an integral sheeting of plastic material, which comprise

treating the plastic sheeting with a swelling agent prior to being erected in position, draining off any excess of swelling agent subsequent to the material swelling to an increase in area of at least 2 percent, applying the swollen material to a ceiling surface by means of conventional mechanical attachment means as a ceiling cover structure, and causing the swelling agent to evaporate totally, whereupon the sheeting contracts and obtains a flat, stretched surface covering.

2. A method according to claim 1, according to which the plastic sheeting is provided with circumferentially extending edge reinforcements facilitating attachment of the sheeting to side portions of the ceiling.

3. A method according to claim 1 according to which the plastic sheeting is treated with a curing agent.

4. A method according to claim 3 wherein the curing agent has a delayed action, which subsequent to applying the sheeting cures the flat, stretched sheet ceiling cover structure.

5. A method according to claim 1, wherein subsequent to draining excess swelling agent from the swollen plastic sheeting and prior to applying the sheeting to a ceiling, the swollen sheeting is packed in such a way that residual swelling agent is prevented from evaporating, and wherein, to prevent contacting sections of the swollen sheeting from sticking together when said sheeting is rolled up or folded, a temporary intermediate layer of a parting material is applied between said contacting surfaces and removed when the ceiling cover structure is being applied to such ceiling.

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