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(54) **METHOD AND DEVICE FOR THE HEATING OF GLUED JOINT**

VERFAHREN UND VORRICHTUNG ZUR BEHEIZUNG VON KLEBVERBINDUNGEN

PROCEDE ET DISPOSITIF PERMETTANT DE CHAUFFER DES ASSEMBLAGES PAR COLLAGE

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Description

[0001] The present invention relates to a method and a device for accelerating curing of a glue joint while the joint is in motion, and particularly for accelerating curing of a glue joint between two elongated objects that are to be glued end-to-end.

[0002] It is known that the curing phase of certain types of glue can be greatly accelerated by heating the glue. This knowledge is applied to shorten manufacturing times and therewith increase productivity in gluing operations, by heating the ends of the objects to be glued together and/or by heating the whole of the glue joint after it has been made. One known method of quickly heating a glue joint employs the use of high-frequency technology (HF-technology), wherein the glue present in the joint is subjected to an high-frequency electric field generated between two electrodes.

[0003] Two methods dominate when gluing elongated objects end-to-end.

[0004] A first of these methods involves passing the "glued" objects through an high-frequency field. As the glue joint enters the high-frequency field, the glue is influenced by the electric field and its temperature quickly increased, this elevated temperature greatly accelerating the glue curing process and therewith curing the glue much more quickly than would otherwise be the case (hours can be reduced to seconds). This method enables the objects to be transported through the HF- field in a continuous stream, i.e. the glue curing process can be effected without disturbing the flow of objects between a glue jointing machine and a subsequent working stage (e.g. a planing or cutting stage).

[0005] One drawback with this method, however, is that the zone in which the high-frequency field is generated is relatively long, because the speeds at which the objects are advanced in present-day glue jointing machines are relatively high (can exceed 120 m/min.). In order to be able to guarantee total curing of the glue, it is necessary to ensure that heating of the glue is sustained over a sufficiently long period of time (normally at least five seconds), which in the case of high feeding speeds means that the zone which contains the high-frequency field must have a relatively long extension when practicing this method (120 m/min. and 5 sec. corresponds to 5x120/60, i.e. a length extension of 10 metres).

[0006] A further drawback with this method is that the whole of the objects concerned pass through the zone, such that parts of the objects other than those parts which border on the glue joints are subjected to the effect of the high-frequency field. There is an obvious risk that when curing glue joints between wooden objects resin agglomerations and moisture enclosed in or bound in the objects, etc., will absorb energy from the high-frequency field. Such absorption will result in undesirable, and in some cases harmful, heating of the objects. It is not unusual to join wooden boards or planks having moisture quotients of up to 18%. At such moisture quotients, energy is absorbed from the high-frequency field throughout the whole of the board, resulting in greater energy consumption. This is because it is necessary to increase the power output of the high-frequency generator in order to compensate for the higher energy consumption.

[0007] The other method involves establishing a glue joint between two boards that pass between two electrodes, said electrodes being positioned against mutually opposing surfaces of the joined boards, said electrodes essentially covering solely the joint. The method involves generating a local high-frequency field which affects solely the glue joint and its immediate surroundings, wherewith the energy consumed is much less than in the case of the earlier described method (the HF-generator requires a lower power output), therewith avoiding unintentional heating of the object in general, because the HF-field is much smaller in this case. The method, however, can only be applied when the glue joint is stationary, because the HF-field is also stationary in the case of this method.

[0008] SE 393 319 describes this latter method and is concerned particularly with the problem of flashover between the electrodes. Flashover will often occur at high powers. Although high powers are desired in order to achieve rapid curing of the glue, high powers are accompanied with the risk of an electrically conductive, ionized cloud forming around the glue joint and if the glue begins to boil. This problem is solved in the aforesaid patent specification, by placing an intermediate layer of vapour-impervious, soft elastic electrically insulating material between the glue joint and the electrodes such as to enclose the glue joint or to shield the glue joint from direct contact with the electrodes.

[0009] The object of the present invention is to provide a method and a device for accelerating curing of a glue joint as the glue joint is in motion, wherein only the glue joint and its immediate surroundings are heated by an accompanying high-frequency electric field.

[0010] Another object of the present invention is to provide a device for accelerating curing of glue joints as they are in motion, said device functioning to cure the glue joints independently of the mutual distance between subsequent glue joints.

[0011] Another object of the present invention is to provide a device for accelerating the curing of glue in finger glue joints between two boards or planks, wherein the device is intended to be placed in direct connection with a finger joint machine and functions to cure the glue in glue joints at the rate at which the glue joints are delivered from the machine.

[0012] These objects are achieved with a method and a device having the features set forth in the following Claims.

[0013] Although the advantages afforded by the device are particularly manifest when the device is placed in direct connection with a finger joint machine in the

manufacture of wooden structural elements, it will be understood that the inventive device is not limited to such use, but can also be used in other adjacent fields, such as in conjunction with gluing other elongated objects, irrespective of whether they are comprised of wood, laminates, plastic or other known material, where high-frequency technology can be applied and which are to be joined end-to-end with forced curing of the glue.

[0014] Although many different designs and makes of finger jointing machines are known to the art, they all have essentially the same following basic functions. A first board or plank is advanced through the finger jointing machine so that the rear end of the board or plank will be located within the machine. A second, following board or plank is then advanced so that its leading end will be located in the machine. The trailing end of the first board and the leading end of the second board are then machined to a desired shape and coated with glue and then pressed together. In the case of known joining machines, the front board is liable to be shifted slightly towards the finger jointing machine as the two ends are pressed together. The thus joined boards, or planks, are then advanced so that the rear end of the last board or plank can be glued to the front end of a following board or plank. The speed at which the boards are advanced in finger jointing machines varies, and speeds of up to 120 m/min. can occur in present-day machines. Extremely long planks or boards are thus formed as starting material for continued processing or treatment.

[0015] A further working station, e.g. a board cutting or board planing station, is usually located downstream of the board joining machine. Before the mutually joined boards can be subjected to a further working process, however, it is necessary for the glue in the glue joints to have cured completely. It is preferred to cure the glue as quickly as possible and as close to its arrival as possible, both from the aspect of the mechanical strength of the joint and from a production economy aspect. The strength of a glue joint will be substantially reduced if movement occurs in the joint, when the joint is allowed to "loosen", and intermediate storage of the glued boards at room temperature while waiting for the glue to cure completely ties-up capital.

[0016] So as not to disturb the flow of material from the finger jointing machine, the inventive device does not include its own feed means but adapts completely to the speed at which the boards or planks are delivered from the finger jointing machine. The device therewith also permits the aforementioned shifting of a board that can occur upon compression of the glue joint.

[0017] The length between the boards to be glued together can vary significantly, therewith placing particular requirements on flexibility and adaptability. This requirement is fulfilled by the inventive device with the aid of means which generate mutually independent HF-fields which accompany each glue joint while heating the glue therein.

[0018] This device is based on the principle of identifying a glue joint as it arrives from the finger jointing machine with the aid of an identifying means which includes, e.g., mechanical, acoustic, odour or light-detecting means (photocell, radar or the like). When a glue joint has been identified, the glue joint is subjected to a high-frequency field by means of an electrode device which accompanies the movement of the glue joint for a period of time or over a distance sufficient to ensure complete curing of the glue.

[0019] The electrode device includes two generally parallel electrode surfaces disposed on respective sides of the glue joint. The electrode surfaces are connected to an HF-generator such as to generate a high-frequency field in the glue joints. The high-frequency field is caused to follow the glue joints until the glue present therein is cured completely. The electrode surfaces are thereafter removed from the glue joint, which has thus been cured to its full mechanical strength therewith enabling the board to be further worked, e.g. milled, cut or planed. In order to enable glue joints that arrive in close succession to be treated effectively, a plurality of mutually independent, movable electrode elements can be arranged in a line, or queue, in the vicinity of the place where the glue joints arrive and each allotted to its individual glue joint and caused to accompany said joint through the device.

[0020] The present invention will now be described in more detail with reference to a preferred embodiment thereof and also with reference to the accompanying drawings, in which **Fig. 1** illustrates schematically a device for carrying out the inventive method; and **Fig. 2** illustrates schematically parts of the Fig. 1 embodiment in larger scale.

[0021] Fig. 1 illustrates a device 1 for forced curing of a glue joint in accordance with one preferred embodiment of the invention. With the intention of clarifying the inventive concept, the device 1 is described as being placed in the immediate vicinity of a finger jointing machine, not shown. A sequence of boards or planks 2 that are joined together by means of glue that is still uncured exit from the finger jointing machine in its longitudinal direction, i.e. to the right in Fig. 1. The boards exiting from the machine are fed directly into the device 1.

[0022] The boards 2 rest in the device 1 on a slide surface 3 and are advanced through said device solely by the propelling force exerted from the finger jointing machine.

[0023] As a glue joint 4 leaving the finger jointing machine enters the device 1, the joint is subjected to a high-frequency field generated between two electrode surfaces connected to a high-frequency generator, not shown. The high-frequency field is caused to accompany the glue joint as it moves through the device, along a specific distance therein. All of the glue joints of the combined board unit will have been completely cured when the unit leaves the device 1, therewith enabling the unit to be safely worked.

[0024] The high-frequency field is generated between

two generally parallel electrode surfaces that are disposed on respective sides of the glue joint to be heated. In the illustrated embodiment, the slide surface 3 is made of aluminum and connected to a first pole of the two poles of the HF-generator, wherein the slide surface 3 forms one, the lower, of said two electrode surfaces. The slide surface 3 may also be provided with a thin friction reducing layer, for instance a Teflon® or like layer, so as to reduce friction, facilitate movement of the boards through the device, and reduce deposits of surplus glue from the glue joints.

[0025] The other electrode surface 5, the upper surface, is comprised of an aluminium plate which is movable in the direction of board movement and which is placed over the glue joint so as to at least cover said joint. The upper electrode surface 5 is connected to the other pole of the HF-generator in a manner described below, therewith to generate an HF-field between the upper and the lower electrode surfaces 5 and 3 respectively. The upper, movable electrode surface 5 is thus able to follow the glue joint as it moves over the slide surface 3, therewith producing an HF-field which accompanies the glue joint.

[0026] In a preferred embodiment, the upper electrode surface 5 is carried by an electrode carriage 6. The electrode carriage is arranged to move along a defining or delimiting surface 7 provided above and parallel with the slide surface 3 and in line with said surface. The carriage 6 is provided with pressure spring means 8 which function to press the electrode surface 5 against the glued boards or planks, such that the electrode surface will overlap the glue joint. By eliminating friction between the electrode carriage 6 and the defining surface 7 in the best possible way, e.g. by allowing the carriage to run on hard wheels, and by avoiding sliding between the upper electrode surface 5 and its abutment surface, the upper electrode surface can be caused to accompany the glue joint as it moves through the device.

[0027] In order to improve engagement of the upper electrode surface 5 with the surface of the objects around the glue joint, the electrode surface may be provided with appropriate engagement means, e.g. studs, serrations, hooks or like devices, either on the electrode surface or in the immediate vicinity thereof.

[0028] In the case of the illustrated embodiment, the defining surface 7 is made of an electrically conductive material and is connected to the HF-generator. Consequently, the electrode carriage 6 is able to transmit HF-voltage from the defining surface 7 to the electrode surface 5 directly, with the aid of a slip shoe or capacitively with the aid of an electrode plate 9 whose surface area is substantially larger than the electrode surface 5 and which is held at a relatively small distance from the defining surface 7.

[0029] Several glue joints arriving in close succession one after the other can readily be subjected to an individual HF-field which accompanies the glue joint through the device, by providing the device with a plurality of electrode carriages. Thus, the capacity of the device can be effectively adapted to requirements and variations in the spacing of mutually sequential glue joints presents no obstacle.

[0030] Arranged on the opposite side of the device is a means which when an electrode carriage 6 has passed through the device 1 functions to remove the electrode carriage from the glue joint and return the carriage to its original position, e.g. in a line, or queue, waiting to be repositioned between a glue joint and the defining surface. The carriage can be returned in any suitable way, for instance by means of a conveyor path, belt conveyor, handling arm or like carriage return means.

[0031] Identification of an arriving glue joint is preferably achieved with the aid of an optical sensor of known design which will indicate when a glue joint is correctly positioned for receiving an electrode surface.

[0032] An electrode carriage 6 can be positioned between the defining surface 7 and the boards or planks 2 in several different ways. For instance, the carriage may be suspended from a vertically movable carrier part which in a lower position forms an extension of the defining surface and which in its upper position is able to receive a further electrode carriage from a line of carriages, wherein infeed to the carrier part can take place with free passage between the electrode surface and the boards. As the glue joint passes beneath the carriage, the movable carrier part is pressed down to the same level as the defining surface, wherewith the spring means 8 on the electrode carriage is compressed and the electrode carriage therewith becomes active in the manner described above. Alternatively, the electrode carriage can be brought to an active position with the aid of an infeed ramp and a push-in means, wherewith the spring means 8 on the electrode carriage will be successively compressed as the carriage is fed in between an upwardly angled initial part, or extension, of the defining surface and the boards at the speed at which the boards are advanced, or with the aid of a funnel-shaped infeed part.

[0033] In order to reduce the risk of the electrode carriage sliding against the surface of the objects as it is pressed down into an active position as the objects move at high speed, the electrode carriage may advantageously be given a shear-elastic property between that part of the carriage which lies against the glue joint (the electrode surface) and that part which lies against the defining surface 7, wherein at least a part of the mass of the electrode carriage will be given a longer acceleration path, i.e. slower acceleration, than the electrode surface 5, said electrode surface preferably engaging the objects instantaneously and assuming the speed of said objects. The shear-elastic property can be achieved by causing the spring means also to spring in the shear direction. The spring means 8 may have the form of coil springs, leaf springs, soft elastic material with resilient properties, etc.

[0034] Depending on the extension of the HF voltage-

applying parts, i.e. the extension of the electrode surface 3 and the defining plane 7, in relation to the wavelength of the high frequency, it is necessary to control the voltage distribution along said parts or surfaces in a known manner with the aid of inductances which connect the lower electrode 3 and the defining surface 7 and are distributed therealong. A primary aim is to maintain the voltage constant along the full extension of said surfaces. However, in the case of certain glue sorts, it may be necessary to lower the voltage during an initial part of said extension, in order to avoid glowing or a disruptive discharge as a result of wet glue. Such voltage distribution can be achieved by appropriate distribution of the inductances.

[0035] One problem that occurs as the electrode carriage moves along the defining surface 7, is that voltage distribution is affected by the carriage the along the full extension of the surface. In order to keep this influence within acceptable limits, it is necessary to keep the characteristic impedence along the defining surface 7 as low as possible. This is achieved by connecting each of the electrode surface 3 and the defining surface 7 to a respective broad rail along the full extent of their respective lengths. The rails are spaced a small distance apart on one side of the lower electrode surface 3 and the defining surface 7. Alternatively, the lower electrode surface 3 can be connected to a screening box or a casing 10 made of electrically conductive material, and the broad plate which includes the defining surface 7 placed at a very small distance beneath the sealing of the casing 10, as shown schematically in Fig. 2.

[0036] By very small distance or relatively small distance is meant here a small distance in relation to the distance between the slide surface 3 and the defining surface 7. The smaller the distance, the smaller the HF-power delivered to the board at those parts thereof that adjoin the glue joint. In practice, said distance will be sufficiently small to allow the HF-voltage to be applied with respect to the risk of flashover.

[0037] Although the present invention has been described above with reference to an exemplifying embodiment thereof, it will be understood that other embodiments and alternative structural detail solutions are conceivable within the scope of the inventive concept. For instance, the electrode means forming the local, joint-accompanying HF-field may be given different configurations in accordance with the application concerned. For instance, two electrode surfaces having a size such as to cover at least the glue joint may be placed on mutually opposite sides of the glue joint and caused to accompany the glue joint as it moves. The electrode surfaces may be carried by carrier means which can be moved in the movement direction of the glue joint, e.g. by arms of a scissor-like or tongs-like device connected to an HF-generator. When the HF-field has fulfilled its purpose and cured the glue in the glue joint after the joint has travelled through a specific distance or after a specific period of time has lapsed, determined among other things by the maximum feeding speed of the jointing machine and the time taken to cure the glue in the HF-field, the electrode surfaces are caused to leave the glue joint, by parting the arms of the scissor-like or tongs-like devices, therewith to return the electrode means to their original positions to await a further glue joint.

[0038] Neither is the invention restricted to the structural materials mentioned in the description. For instance, the aluminium in the electrode surfaces and in other electrically conductive components can be replaced with other electrically conductive materials, such as metal sheet, steel, copper or the like. The friction-reducing and adhesion-reducing materials mentioned in the aforegoing can also be replaced with other materials having similar properties.

[0039] Although the device has been described with reference to a feeding finger jointing machine, it will be understood that the invention is not restricted to such a machine and that the invention can be applied with any known object feeding means.

Claims

1. A method of curing glue joints between objects (2) as said objects move, wherein the glue joints are cured in a high-frequency (HF) electric field generated between two electrode surfaces (3, 5) disposed on respective opposite sides of the mutually joined objects and connected to a high-frequency generator, **characterized by** causing an HF-field which is limited essentially to said glue joint (4) to accompany said glue joint through a specific distance sufficient to achieve curing of the glue in said glue joint, by moving the objects (2) along a stationary elongated electrode surface (3) which consists of one of said two electrode surfaces, and by causing a movable electrode surface (5) which consists of the other of said two electrode surfaces and which at least covers said glue joint to accompany the glue joint as it moves.

2. A method according to Claim 1, **characterized by** bringing the movable electrode surface into abutment with the glue joint.

3. A method according to any one of the preceding Claims, **characterized by** the steps of identifying the position of an arriving glue joint, applying to the glue joint a movable electrode surface which covers at least the glue joint, removing the movable electrode surface from the cured glue joint subsequent to said electrode surface having moved through a specific distance; and returning said movable electrode surface to a line or queue of such surfaces.

4. Apparatus for curing glue joints (4) between objects

(2) during movement of said objects, wherein the objects are glued end-to-end and wherein the glue joints are cured in a high-frequency electric field generated between two electrode surfaces (3, 5) disposed on respective opposite surfaces of the mutually joined objects (2) and connected to a high-frequency generator, **characterized in that** a first (3) of said two electrode surfaces is stationary and elongated and has a length sufficient to effect curing of a glue joint moving along said electrode surface; and **in that** the second (5) of said electrode surfaces is movable in the direction of movement of the glue joint and has a surface which at least covers the glue joint.

5. Apparatus according to Claim 4, **characterized in that** the apparatus includes a slide surface (3) on which the mutually glued objects can slide through the apparatus; and **in that** the slide surface includes said stationary, elongated electrode surface.

6. Apparatus according to Claim 4 or Claim 5, **characterized in that** the movable electrode surface (5) is carried by a carrier means (6) which when in an active position is able to move along a defining surface (7) disposed above, parallel with and in line with said slide surface (3); and **in that** the carrier means (6) includes a spring means which functions to bring the movable electrode surface into abutment with the glue joint (4).

Patentansprüche

1. Verfahren zum Aushärten von Klebeverbindungen zwischen Gegenständen (2), wenn sich die Gegenstände bewegen, wobei die Klebeverbindungen in einem elektrischen Hochfrequenz (HF) - Feld ausgehärtet werden, das zwischen zwei Elektrodenflächen (3, 5) erzeugt wird, welche an einander abgewandten Seiten der miteinander verbundenen Gegenstände angeordnet und mit einem Hochfrequenzgenerator verbunden sind,
gekennzeichnet durch das Bewirken eines die Klebeverbindung über eine bestimmte Distanz, die ausreicht, um ein Aushärten des Klebstoffes in der Klebeverbindung zu erzielen, begleitenden HF-Feldes, das im wesentlichen auf die Klebeverbindung (4) begrenzt ist, indem die Gegenstände (2) entlang einer stationären, langgestreckten Elektrodenfläche (3) bewegt werden, die aus einer der zwei Elektrodenflächen besteht, und indem eine bewegbare Elektrodenfläche (5), die aus der anderen der zwei Elektrodenflächen besteht und die zumindest die Klebeverbindung überdeckt, die Klebeverbindung begleitet, wenn sie sich bewegt.

2. Verfahren nach Anspruch 1,
gekennzeichnet durch das Bringen der bewegbaren Elektrodenfläche auf Anschlag gegen die Klebeverbindung.

3. Verfahren nach einem der vorhergehenden Ansprüche,
gekennzeichnet durch
die Schritte des Identifizierens der Position einer ankommenden Klebeverbindung; Aufbringen einer bewegbaren Elektrodenfläche, welche zumindest die Klebeverbindung überdeckt, an die Klebeverbindung; Entfernen der bewegbaren Elektrodenfläche von der ausgehärteten Klebeverbindung, nachdem die Elektrodenfläche über eine bestimmte Distanz bewegt worden ist; und Zurückbringen der bewegbaren Elektrodenfläche zu einer Linie oder Reihe solcher Elektrodenflächen.

4. Vorrichtung zum Aushärten von Klebeverbindungen (4) zwischen Gegenständen (2) während einer Bewegung der Gegenstände, wobei die Gegenstände stirnseitig verklebt sind und wobei die Klebeverbindungen in einem elektrischen Hochfrequenz-Feld ausgehärtet werden, das zwischen zwei Elektrodenflächen (3, 5) erzeugt wird, welche an einander abgewandten Seiten der miteinander verbundenen Gegenstände (2) angeordnet und mit einem Hochfrequenzgenerator verbunden sind,
dadurch gekennzeichnet,
dass eine erste (3) der zwei Elektrodenflächen stationär und langgestreckt ist und eine Länge aufweist, die ausreicht, um ein Aushärten einer sich entlang der Elektrodenfläche bewegenden Klebeverbindung zu bewirken; und
dass die zweite (5) der Elektrodenflächen in der Bewegungsrichtung der Klebeverbindung bewegbar ist und eine Fläche besitzt, die zumindest die Klebeverbindung überdeckt.

5. Vorrichtung nach Anspruch 4,
dadurch gekennzeichnet,
dass die Vorrichtung eine Gleitfläche (3) enthält, auf der die miteinander verklebten Gegenstände durch die Vorrichtung gleiten können; und
dass die Gleitfläche die stationäre, langgestreckte Elektrodenfläche enthält.

6. Vorrichtung nach Anspruch 4 oder 5,
dadurch gekennzeichnet,
dass die bewegbare Elektrodenfläche (5) durch eine Trägervorrichtung (6) gehalten ist, die in einer aktiven Position in der Lage ist, sich entlang einer Grenzfläche (7) zu bewegen, die oberhalb, parallel zu und ausgerichtet zu der Gleitfläche (3) angeordnet ist; und
dass die Trägervorrichtung (6) eine Federvorrichtung enthält, welche dazu dient, die bewegbare Elektrodenfläche in Anschlag zu der Klebeverbin-

dung (4) zu bringen.

Revendications

1. Procédé permettant de durcir des assemblages par collage entre des objets (2) lorsque lesdits objets se déplacent, dans lequel les assemblages par collage sont durcis dans un champ électrique haute-fréquence (HF) généré entre deux surfaces d'électrodes (3, 5) disposées sur des côtés opposés respectifs des objets assemblés mutuellement et raccordées à un générateur haute fréquence, **caractérisé en ce que** l'on amène un champ HF sensiblement limité audit assemblage par collage (4) à accompagner ledit assemblage par collage sur une distance spécifique suffisante pour réaliser le durcissement de la colle dans ledit assemblage par collage **en ce que**, l'on déplace les objets (2) le long d'une surface d'électrode allongée fixe (3) qui est constituée d'une desdites deux surfaces d'électrodes, et **en ce que** l'on amène une surface d'électrode mobile (5), constituée de l'autre desdites deux surfaces d'électrodes, et qui recouvre au moins ledit assemblage par collage, à accompagner l'assemblage par collage au fur et à mesure qu'il se déplace.

2. Procédé selon la revendication 1, **caractérisé en ce qu'**on met la surface d'électrode mobile en butée contre l'assemblage par collage.

3. Procédé selon l'une quelconque des revendications précédentes, **caractérisé par** des étapes consistant à identifier la position d'un assemblage par collage qui arrive, à appliquer à l'assemblage par collage une surface d'électrode mobile qui recouvre au moins l'assemblage par collage, à retirer la surface d'électrode mobile de l'assemblage par collage chauffé une fois que ladite surface d'électrode s'est déplacée sur une distance spécifique ; et à faire revenir ladite surface d'électrode mobile vers une ligne ou file de ces surfaces.

4. Appareil permettant de durcir des assemblages par collage (4) entre des objets (2) au cours du déplacement desdits objets, dans lequel les objets sont collés bout à bout et dans lequel les assemblages par collage sont durcis dans un champ électrique haute fréquence généré entre deux surfaces d'électrodes (3, 5) déposées sur les surfaces opposées respectives des objets (2) reliés ensemble et raccordés à un générateur haute fréquence, **caractérisé en ce qu'**une première (3) desdites deux surfaces d'électrodes est fixe et allongée et présente une longueur suffisante pour réaliser le durcissement d'un assemblage par collage se déplaçant le long de ladite surface d'électrode ; et **en ce que** la deuxième (5) desdites surfaces d'électrodes peut se déplacer dans le sens du déplacement de l'assemblage par collage et présente une surface qui recouvre au moins l'assemblage par collage.

5. Appareil selon la revendication 4, **caractérisé en ce que** l'appareil comprend une surface de glissement (3) sur laquelle les objets collés mutuellement peuvent glisser au travers de l'appareil ; et **en ce que** la surface de glissement comprend ladite surface d'électrode allongée, fixe.

6. Appareil selon la revendication 4 ou la revendication 5, **caractérisé en ce que** la surface d'électrode mobile (5) est entraînée par des moyens porteurs (6) qui, quand ils se trouvent dans une position active, sont capables de se déplacer le long d'une surface de définition (7) disposée au-dessus, parallèlement à et alignée avec ladite surface de glissement (3) ; et **en ce que** les moyens porteurs (6) comprennent des moyens formant ressort qui agissent pour mettre la surface d'électrode mobile en butée contre l'assemblage par collage (4).

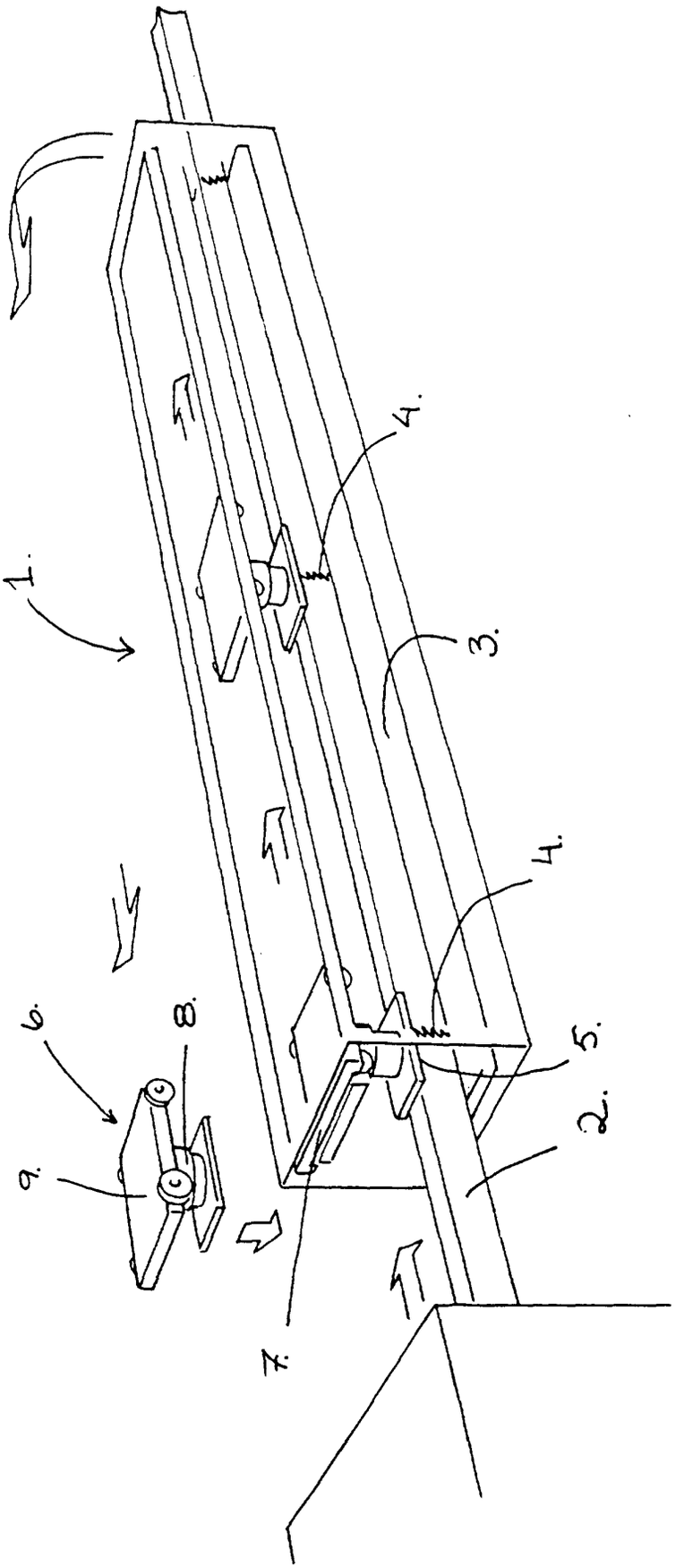

Fig 1

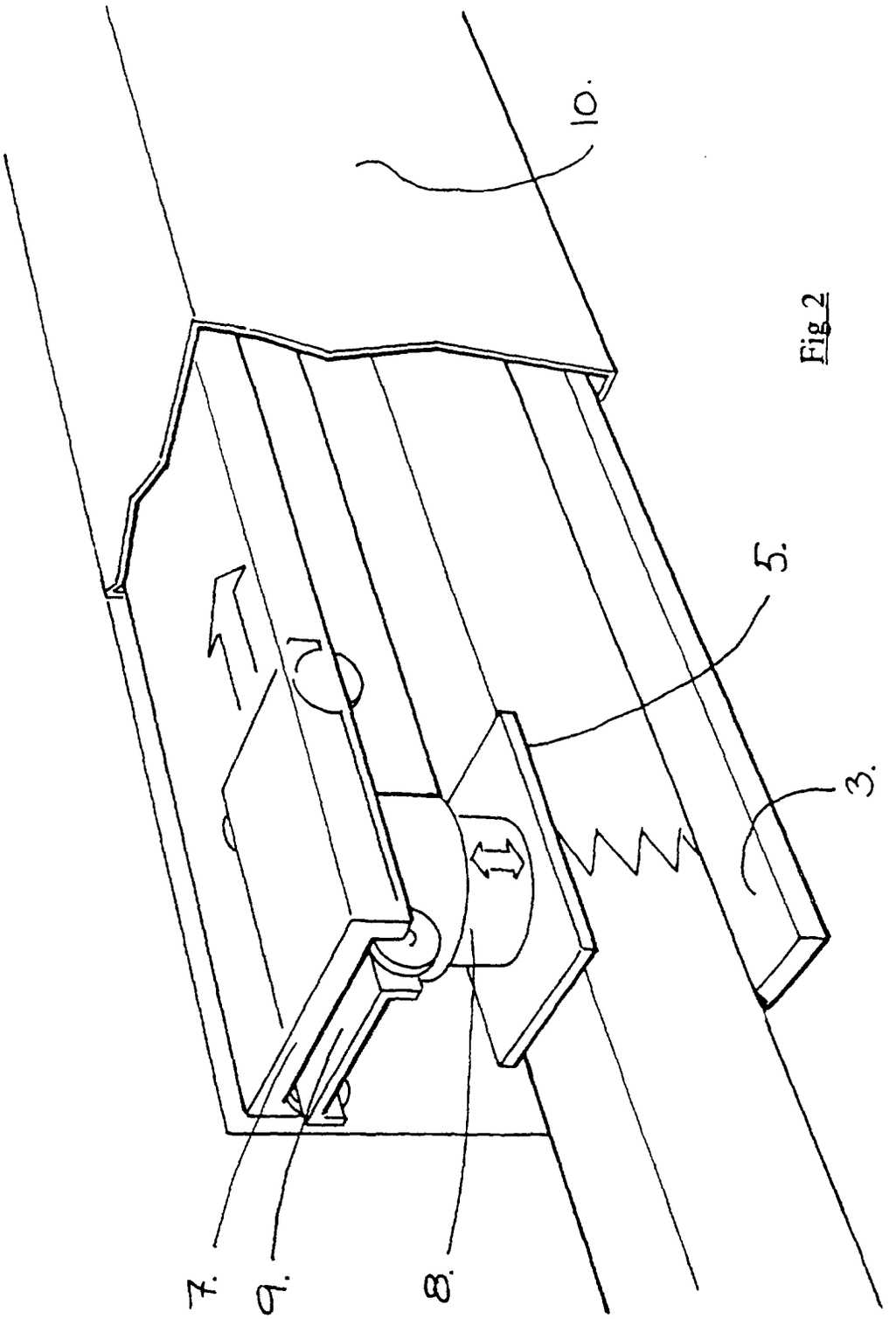

Fig 2