Nov. 12, 1946. E. J. KLASSEN 2,411,043

THERMO-PRESSURE GLUING PRESS

Filed Nov. 24, 1943 6 Sheets-Sheet 1

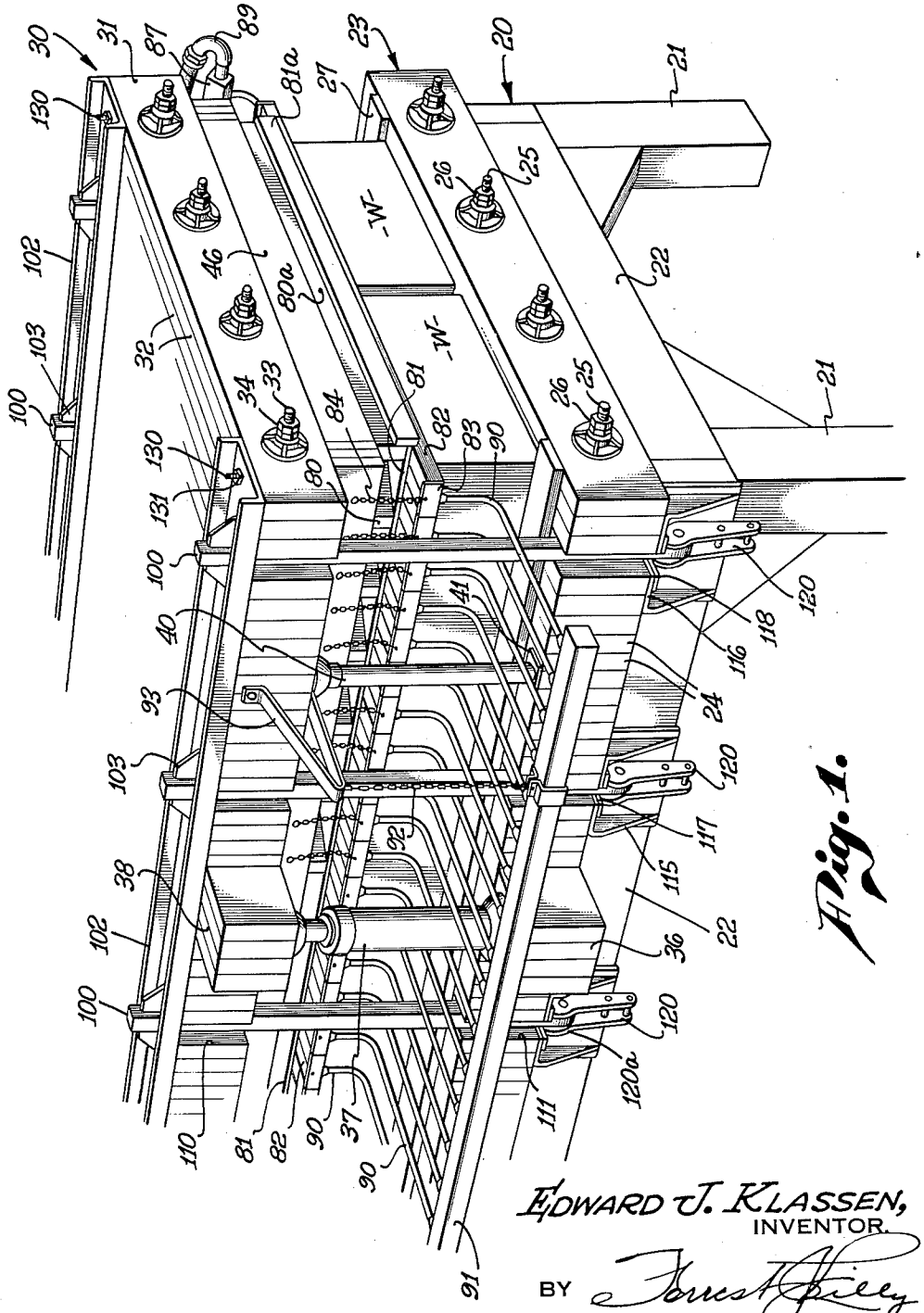


Fig. 1.

EDWARD J. KLASSEN,
INVENTOR.

BY Forrest Kelley

ATTORNEY.

Nov. 12, 1946. E. J. KLASSEN 2,411,043

THERMO-PRESSURE GLUING PRESS

Filed Nov. 24, 1943 6 Sheets-Sheet 2

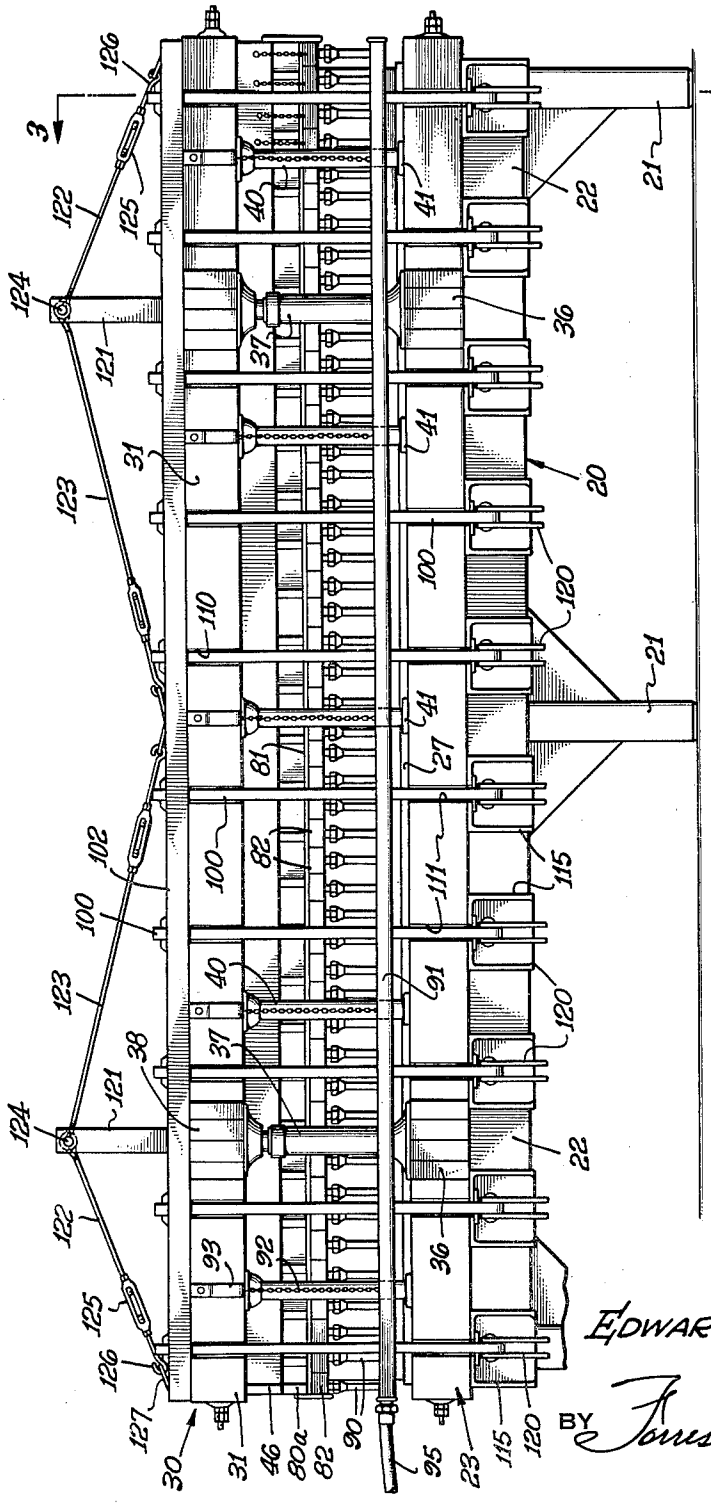


Fig. 2.

EDWARD J. KLASSEN,
INVENTOR.

BY Forrest J. Lilley
ATTORNEY.

Nov. 12, 1946. E. J. KLASSEN 2,411,043

THERMO-PRESSURE GLUING PRESS

Filed Nov. 24, 1943 6 Sheets-Sheet 3

Fig. 4.

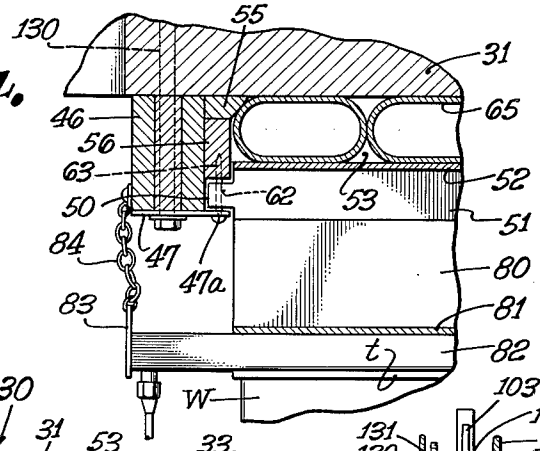


Fig. 3.

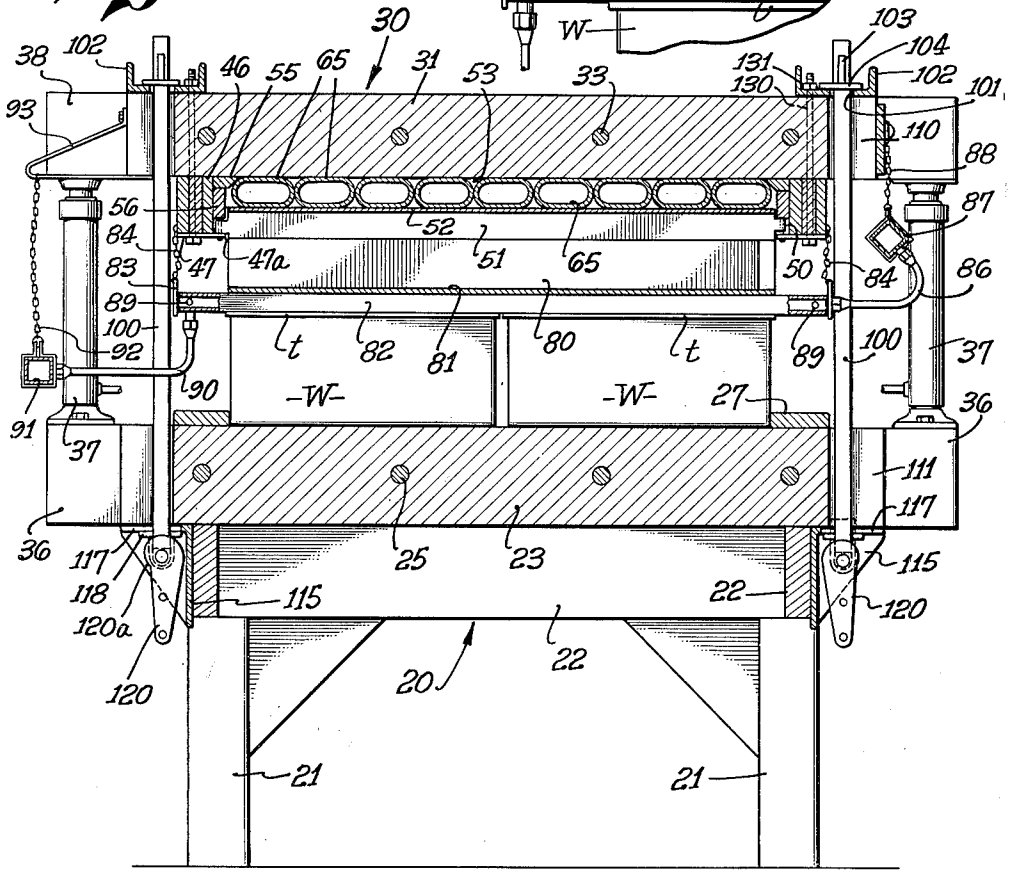
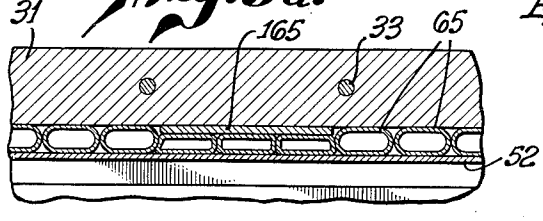


Fig. 3a.



EDWARD J. KLASSEN,
INVENTOR.

BY Forrest J. Lee

ATTORNEY.

Nov. 12, 1946. E. J. KLASSEN 2,411,043

THERMO-PRESSURE GLUING PRESS

Filed Nov. 24, 1943 6 Sheets-Sheet 4

Fig. 5.

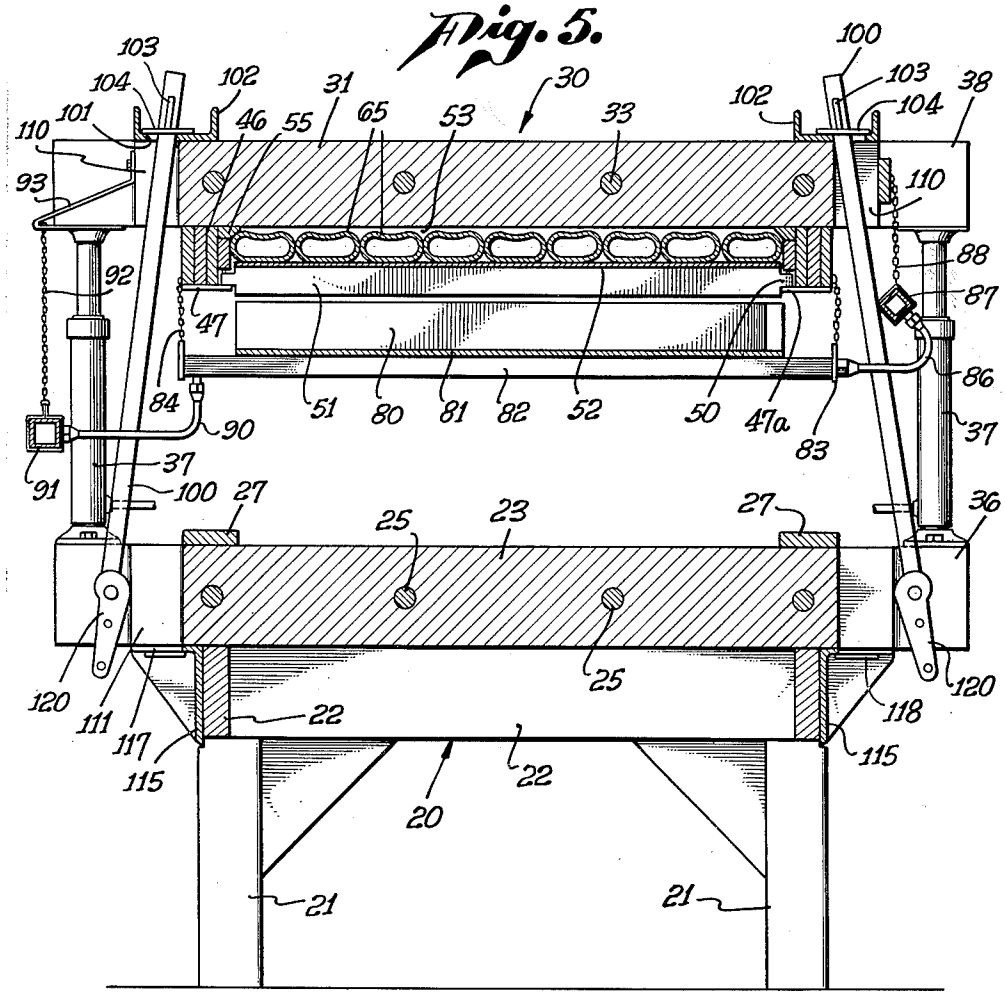
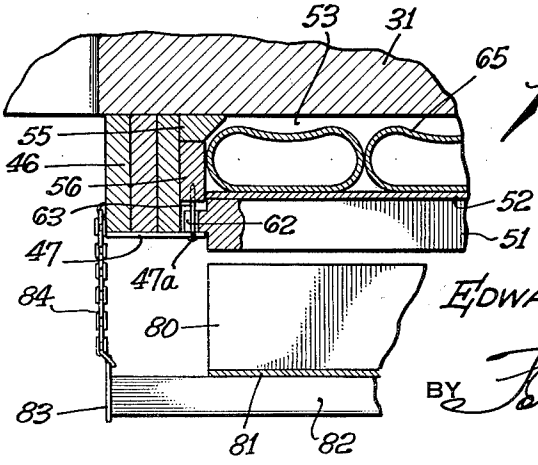


Fig. 6.



EDWARD J. KLASSEN,
INVENTOR.

BY

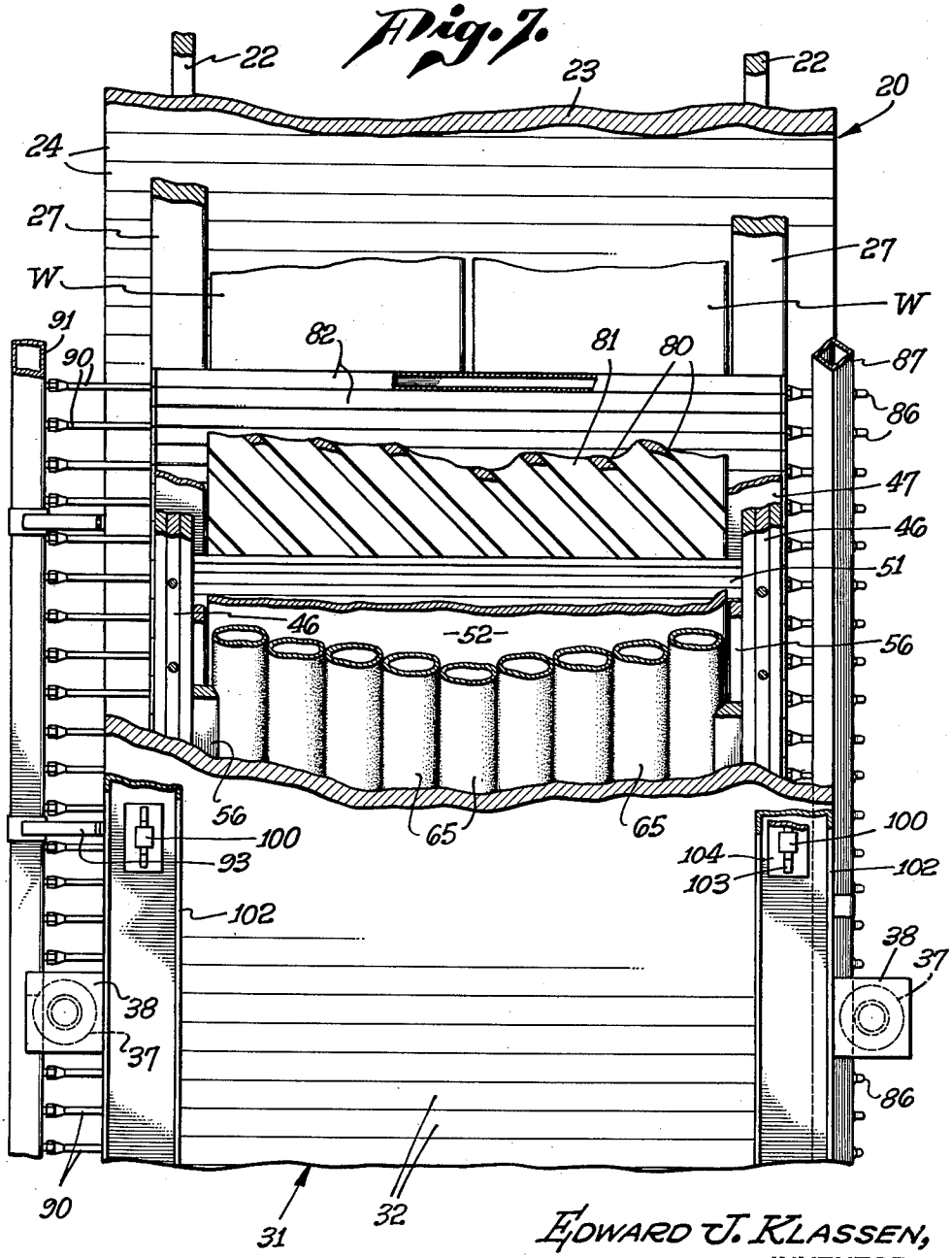
ATTORNEY.

Nov. 12, 1946. E. J. KLASSEN 2,411,043

THERMO-PRESSURE GLUING PRESS

Filed Nov. 24, 1943 6 Sheets-Sheet 5

Fig. 7.



HOWARD J. KLASSEN,
INVENTOR.

BY

ATTORNEY.

Nov. 12, 1946. E. J. KLASSEN 2,411,043

THERMO-PRESSURE GLUING PRESS

Filed Nov. 24, 1943 6 Sheets-Sheet 6

Fig. 8.

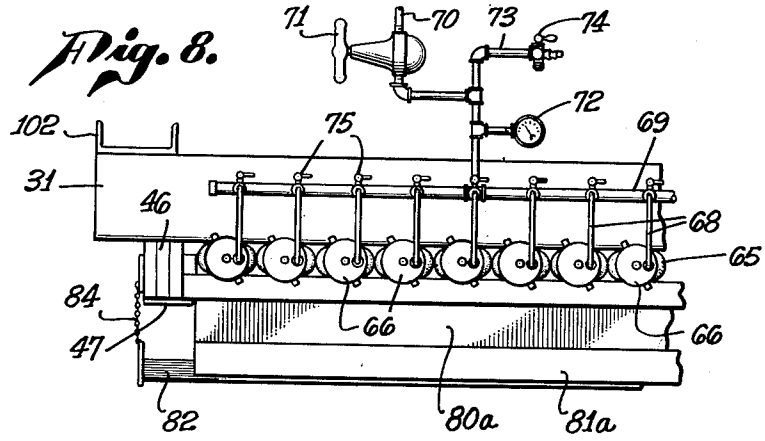


Fig. 9.

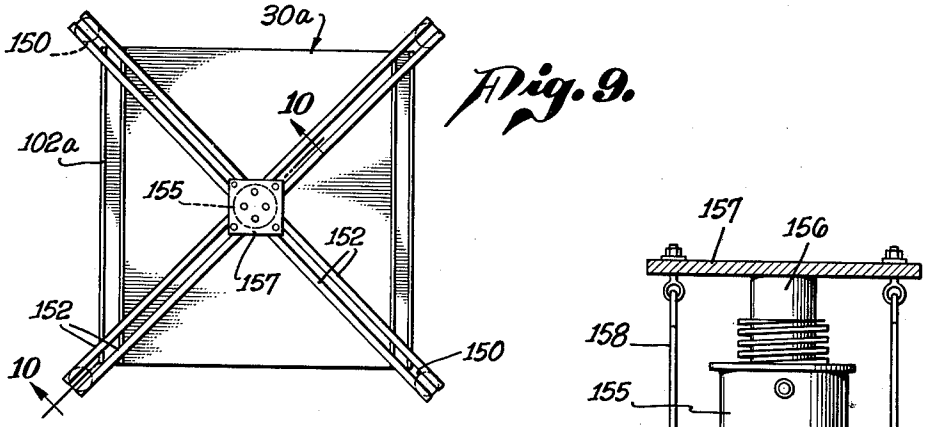
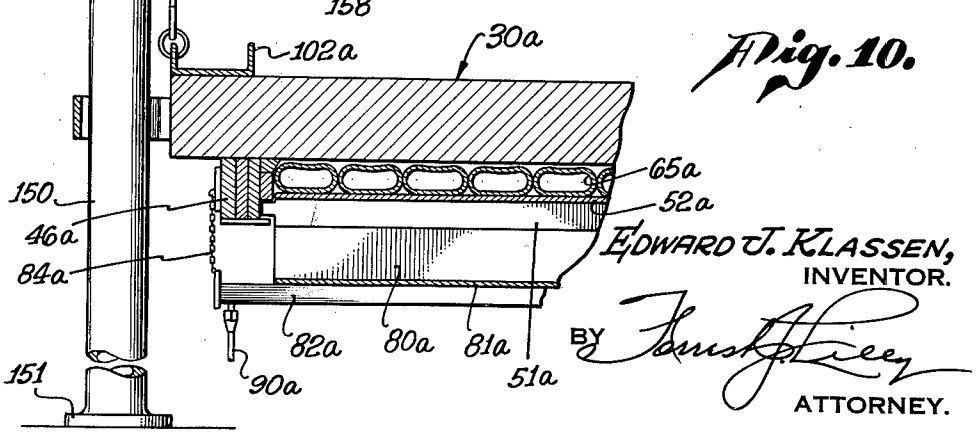


Fig. 10.



EDWARD J. KLASSEN,
INVENTOR.

BY

ATTORNEY.

Patented Nov. 12, 1946

2,411,043

UNITED STATES PATENT OFFICE

2,411,043

THERMOPRESSURE GLUING PRESS

Edward J. Klassen, Los Angeles, Calif.

Application November 24, 1943, Serial No. 511,541

8 Claims. (Cl. 144—281)

1

This invention relates generally to thermopressure presses for applying heat and pressure to members which are being glued together to expedite setting of the glue.

The present invention may be regarded generally as dealing with improvements and modifications in the subject matter of my prior Patent No. 2,337,250, issued December 21, 1943. The subject matter of said prior patent was disclosed in a specific embodiment designed particularly for the purpose of the simultaneous gluing of plywood skins to the opposite sides of a wood construction airfoil. The present invention is illustratively disclosed in a form more particularly designed for the purpose of gluing a plywood surface to one side of a relatively long box-like structure, such as the wing spar of a wood construction airplane or glider. It will be understood, however, that this is for illustrative purposes only, and without implied limitation to the example selected.

The glue used at the present time in wooden aircraft and glider construction is of a phenolic plastic type whose setting time is greatly reduced in the presence of heat, and it is accordingly the practice to apply heat to the exterior surface of the plywood after the latter has been applied to the glue-coated structure to which it is to be secured. As in any gluing operation, it is also desirable to apply pressure, and it is accordingly the combined purpose to apply heat and pressure simultaneously to the members to be glued together.

It has become a common practice in the art to apply pressure over a surface to be glued by means of a pneumatic bag, which, when inflated, exerts a uniform pressure against the surface. The press disclosed in my aforesaid copending application is of such a type, and the present invention may be regarded generally as involving improvements in apparatus of the character indicated.

The general object of the invention is accordingly the provision of improvements in apparatus for practicing the "rubber bag" gluing process.

A further object of the invention is the provision of a press of the general type mentioned, adapted particularly to the handling of relatively long box-like structures.

Previously known presses of the type in question have encountered difficulty owing to deterioration of and other difficulties with the pneumatic rubber bag. The present invention utilizes in place of the usual rubber bag a plu-

2

rality of flexible tubes or hoses, of a typical diameter of approximately three inches, and for which purpose I preferably and conveniently employ sections of ordinary fire hose. Such hose is readily procureable, is not subject to relatively rapid deterioration, is relatively simple to install and handle generally, and serves the purpose at least as well, considered functionally, as the more usual rubber bag. The press of the present invention also involves improvements and modifications designed to suit the press to relatively long box-like structures such as the wing spars of relatively large-sized gliders. These improvements and modifications may, however, best be left for discussion in the course of the following detailed description of a present specific embodiment of the invention, for which purpose reference is made to the accompanying drawings, in which:

Fig. 1 is a perspective view showing one end and a portion of the side and top of a press in accordance with the invention;

Fig. 2 is a side elevation of the press of Fig. 1;

Fig. 3 is a vertical section on line 3—3 of Fig. 2, the press being shown in closed position;

Fig. 3a is a fragmentary view similar to a portion of Fig. 3 but showing a modification;

Fig. 4 is an enlarged fragmentary view of a portion of Fig. 3;

Fig. 5 is a section similar to Fig. 3, but showing the press in open or elevated condition;

Fig. 6 is an enlarged detail taken from Fig. 5;

Fig. 7 is a fragmentary plan view of the press with parts broken away;

Fig. 8 is a fragmentary end elevation of the press looking at the opposite end of the press from that shown in Fig. 1;

Fig. 9 is a plan view of a modified form of press; and

Fig. 10 is a fragmentary sectional view taken on line 10—10 of Fig. 9.

Referring now to the drawings, I show at 20 a suitable supporting table or bench having legs 21, a rectangular bed frame 22 supported on top of legs 21, and a top 23 comprising transversely extending planks 24, resting on edge on frame 22 and drawn together by long tension rods 25 and nuts 26. Secured down to top 23, near the longitudinal edges thereof, are longitudinally extending guide strips 27 adapted to receive the work between them.

In certain of the figures of the drawings, the work W is shown in the form of two separate skeleton box structures, received on table 20 between guide strips 27 and extending substan-

tially from end to end of the press. The press may, of course, be designed to accommodate but one structure at a time, though in the present instance it is convenient to handle two structures W simultaneously, side by side. The structures W, which might, for example, be wing spar structures, are shown as having top plywood sheets or layers *t* (see Fig. 3) which are to be understood as the members intended to be glued down to the structures W. By way of further description of a typical application, the spar structures W may be of typical cellular construction, understood to comprise a multiplicity of cell defining surfaces or walls having edges coplanar with its top surface, and it is to such surfaces or edges, as well as to the edges of the sides and ends of the members W, that the top sheet *t* is to be glued. The heat and pressure applying members now about to be described are designed for uniform application of heat and pressure simultaneously to the top surface of the top sheets or layers *t*, by which the latter may be caused to become glued securely to the various edge surfaces of the structures W which they engage.

Overlying the work members W is a vertically movable head structure 30, which incorporates the later described heating and pressure means. This head structure includes a relatively heavy top 31 comprising transversely extending planks 32 placed face to face and drawn together by means of long tension rods 33 and nuts 34, the structure being similar to, and directly overlying the top structure 23 of supporting table 20. At suitable points along the two sides of the press, the planking making up the table top 23 and the head structure top 31 is extended to provide footings 36 for hydraulic jacks 37, and abutments 38 by which said jacks may engage and elevate the head 30. As here shown, provisions are made for two such jacks along each side of the press, although any suitable number may of course be employed depending both upon the length and weight of the press, and the size of the jacks to be used. Preferably, the top 31 of head structure 30 is provided on its underside, along its two longitudinal edges, with legs 40 which are adapted when the head structure has been lowered by jacks 37 to engage foot plates 41 secured to the upper side of table top 23.

Secured to the undersides of the longitudinal edge portions of head structure top 31 are aprons 46, here shown as comprising three-ply wood structures (see Figs. 3 and 4), and secured to the bottoms of these aprons 46 are plates 47 which project inwardly somewhat from the aprons to provide a narrow ledge 47*a*, as may be seen by inspecting Figs. 3 and 4. Resting on these ledges are end projections 50 of slats 51 which extend transversely across the press. There are a large number of these slats 51 lying substantially in engagement with one another, and the entire bed or curtain of slats makes up a somewhat flexible structure through which downward pressure may be exerted with substantial uniformity over the entire area of the bed.

Above the slats 51 is a somewhat flexible sheet 52, conveniently fabricated of press board, which, together with the lower surface of head structure top 31, defines a compartment 53 for the pneumatic element of the press. Mounted inside aprons 46 and between slat projections 50 and the underside of top 31 are upper and lower filler strips 55 and 56, respectively, the lower edge of the latter, together with projecting ledge 47*a* of plate 47, defining a pocket for the reception of the slat projections 50. The slats 51 are preferably positioned longitudinally of the press by means of screws 63 passing through ledges 47*a* and into strips 56, said screws being receivable in notches 62 in the ends of slat projections 50 (Fig. 6).

While pneumatic means in the usual form of a rubber bag might be used within the compartment 53, the invention in its preferred form provides pneumatic means in the form of a plurality of flexible tubes 65, arranged parallel to one another and in a direction longitudinally of the press, that is, at right angles to the transversely extending bed slats 51. And while these flexible tubes might be of any suitable material, as rubber, I prefer to employ for the purpose fabric hoses of the type conventionally employed as fire hose. At the end of the press seen in Fig. 8, the ends of these tubes or hoses are closed by means of conventional caps 66, which are fitted with metal tubes 68 through which air under pressure may be introduced. The tubes 68 lead from a header 69, which is in turn fed from a supply pipe line 70 controlled by a valve 71 and provided with a pressure gage 72. Air may be discharged from the system by means of pipe 73 having valve 74. The individual feed tubes 68 may be provided with individual valves 75. At the other ends of the press, the tubes or hoses 65 may be closed by means of suitable caps (not shown) similar to the caps 66, but without the air connections 68. These ends of the tubes do not appear in Fig. 1 showing the other end of the press as they are obscured by an end wall or apron 76.

In the present illustrative embodiment of the invention, there is, immediately below slats 51, a plurality of spaced, wooden strips 80, disposed so as to cross the slats 51. In the present embodiment, the strips 80 are arranged substantially at 45 degrees to the slats 51, so that each of the slats is crossed by a plurality of strips 80. Secured to the lower edges of the spaced angular strips 80 is a plywood sheet 81, and the latter rests on and is carried by a bed over transversely extending steam tubes 82, of rectangular cross-section. At each end of the somewhat flexible partition structure comprising the angular strips 80 and plywood sheet 81 is an end strip 80*a* (Fig. 1), to which is secured a cleat 81*a* that partially overhangs the steam tubes 82.

The steam tubes 82 are preferably arranged in pairs, each pair having a pair of end-closing plates 83, and each of said plates 83 being flexibly suspended from the overlying apron 46 by means of a flexible supporting element, such as a chain 84. The flat undersides of the tubes 82 are engageable with the plywood tops *t* which are to be glued to the box structures W. Steam is admitted to one end of each pair of steam tubes 82 by means of a tube 86 leading from a steam supply header 87, which is suspended from the head structure by a flexible supporting element such as flexible chain 88. Steam is introduced to the header 87 by means of a suitable connection 89 (see Fig. 1). The admission tube 86 for each pair of steam tubes 82 opens through plate 83 within one of the two tubes 82, and the steam flows into the other of the tubes by means of a suitable intercommunicating port 89 near the steam entry ends of the tubes. A similar port 89 establishes communication between the other ends of the tubes, and a steam outflow pipe 90 extending downwardly from one of the tubes

takes the used steam from the pair. The tubes 90 communicate with a discharge header 91, suspended from the head of the press by a flexible element such as chain 92, which is here shown as hung from a bracket 93 secured to the side of top 31. Outflow header 91 has coupled to one end thereof a suitable steam discharge line 95 (Fig. 2).

As will be seen in Fig. 5, the chain-suspended steam tubes carry the plywood sheet 81 and angular strips 80 when the press is open, the slats 51 being carried by the ledges 47a. When the press is closed, however, the steam pipes come to rest upon the work, and the space between the upper edges of strips 80 and the slats 51 is taken up, the chains 84 hanging slack. The major weight of the head structure is at such time assumed by the legs 40, which are then in engagement with the supporting table, and the relations are such that the slat projections 50 are at the same time elevated slightly above ledges 47a (Figs. 3 and 4).

Clamping means are provided for securing the vertically movable head 30 tightly down to table 20 when the press is in closed position. The preferred clamping means comprises a plurality of vertically arranged bars 100 anchored at their tops to the top of the vertically movable head structure, and releasably engageable at their lower ends with the top of supporting table 20. As here shown, the bars 100 pass through apertures 101 formed in the webs of channel irons 102 secured along the two longitudinal edges of the top sides of head top 31. Cross-piece 103 carried by the upper end portions of the bars 100 engage washers 104 which rest on the web of the channel member and which are of a larger size than the apertures 101 of the latter. The apertures in the washers 104 receive the bars 100 with a comparatively loose fit, so as to permit the bars 100 to be swung outwardly, as to the positions of Fig. 5, to permit the lower ends of the bars to be cleared from the latter described clamping brackets.

Bars 100 pass downwardly through notches 110 and 111 formed in the edges of the head top 31 and table top 23, respectively. Secured to table frame 22, just below the notches 111, are clamp brackets 115, having upper walls 116 formed with notches 117 aligned with the notches 111. These notches 117 are flanked by bearing plates 118 secured to the undersides of the upper bracket walls 116. The lower ends of the bars 100 carry clamp devices comprising pairs of cam levers 120 pivotally connected to the bars 100 and formed with cam shoulders 120a of gradually increasing radius adapted to engage the bearing plates 118. When the levers 120 are elevated (swung relatively outwardly from the bars), the cam shoulders may be moved easily under the bearing plates 118, the press of course being assumed to be closed. Downward movement of the levers 120 then sets the clamp devices up tightly, placing the bars 100 under tension, and securing the movable head structure of the press tightly down in operative position.

In case the press is fairly long between the points of support of the head structure by the hydraulic jacks 37, the head structure may, if unbraced, tend to sag to a slight but undesirable degree between those points of support. Accordingly, I preferably provide bracing means comprising uprights 121 mounted in each of the channel members 102, approximately in the transverse plane of the hydraulic jacks 37, and cables 122 and 123 connected between the upper ends of these uprights, and points of anchorage to the channel members, the cables 122 being connected near the ends of the channel members and the cables 123 being connected near the center thereof. As here shown, each of the cables 122 and 123 is connected at its upper end to cross-shaft 124 mounted in the upper ends of the associated pair of uprights 121. The lower ends of said cables are connected to turn buckles 125, to which are connected hooks 126 engaging with suitable eyes in straps 127 welded or otherwise secured to the channel members 102. The turnbuckles 125 permit adjustment of tension in the cables, and may be adjusted to assure proper support of the channel members 102. The channel members 102 are secured firmly to the top structure 31 by means of bolts 130 extending downwardly through the webs of the channel members, the top 31, aprons 46 and plates 47, nuts 131 securing the parts in assembly, all as clearly appears in Figs. 3 and 4.

Operation of the press is as follows:

The head structure of the press being elevated by means of jacks 37 to the position of Fig. 3, the work structures W with their top members *t* freshly glued thereto are inserted from one end. The tubes or hoses 65 are at this time deflated, the slats 51 are resting on the ledge 47a, and the angular strips 80 and steam pipes 82 hang freely from the supporting chains 84, there being a little space between the slats 51 and the strips 80. Steam will at this time be flowing through the system, entering via header 87, passing through the steam pipes 82 and leaving via outflow header 91. The head structure 30 is then lowered by means of jacks 37. Just before the legs 40 strike bottom, the steam pipes 82 engage the top *t* of the work, so that as the head structure 30 then continues downwardly the small remaining distance, the supporting chains 84 slacken and the slats 51 become elevated slightly relatively to their supporting ledges 47a. There is preferably provided only a fraction of an inch of such downward movement of the head structure following engagement of the steam pipes with the work. Such downward movement is terminated, as heretofore indicated, by the engagement of legs 40 with foot plates 41. The clamp bars 100 are then moved inwardly to the position of Fig. 3 and the clamp levers are set up, following which compressed air is introduced to the ends of the hoses 65. These hoses then assume positions such as indicated in Figs. 3 and 4, their sides flattening somewhat against the underside of the top 31 and against the sheet 52 overlying the slats 51. By this means, a substantial downward pressure is exerted on the bed of flexibly supported slats 51, being transmitted in turn through the cross-strips 89, the plywood sheet 81 and the steam pipes 82 to the top members *t*, pressing the latter firmly and uniformly down on the structures W. The various members provided between the hoses and the work are designed for a certain degree of flexibility and to permit a slight amount of "working" of the various components relatively to one another, thereby accomplishing a uniform transmission of pressure from the hoses 65 to the work over the entire area of the latter.

Figs. 9 and 10 show a modification of the means which elevates the head structure of the press. The press in this instance may be regarded as similar in all essential respects to the embodiment previously described, excepting for the modified elevating means, and excepting for the further

fact that the press of Figs. 9 and 10 is shown as considerably shortened relatively to its width, being in fact nearly square as viewed in plan (Fig. 9). For convenience, components of the press of Figs. 9 and 10 corresponding to those of the embodiment of Figs. 1–8 will be identified by similar reference numerals but with the subletter *a* appended.

At the four corners of the press are arranged vertical columns 150, provided at their lower ends with floor flanges 151. Diagonally opposite pairs of these columns 150 support pairs of spaced members 152 which extend diagonally across over the top of the press, the structure forming a cross, as appears in Fig. 9. The center of this cross supports the base of an air cylinder 155, the plunger 156 of which carries a cross-head 157. Four cables 158 connected to this cross-head extend downwardly within the channels or spaces between the pairs of members 152, passing under pulleys 159 carried by the members 152, thence outwardly and over pulleys 160 also supported by members 152, and finally downwardly to connect with the flanges of channel members 102*a*.

To elevate the head structure of the press, air is introduced to cylinder 155, causing the plunger 156 to move upwardly, and so moving the cables 158 in the proper direction to elevate the head structure. Attention is called to the fact that the center of the cross formed by the members 102 does not carry any part of the load of the head structure, which is imposed entirely on the pulleys 160 located immediately adjacent the supporting columns 150. There is of course tension in the cables 158 between the cross-head 157 and the pulleys 159, but there is no downward load on the center of the cross-structure beyond that imposed by the weight of the air cylinder itself. When air is exhausted from the cylinder 155, a coil spring around piston 156 is engaged by cross-head 157 to support the latter and the piston 156 in such a way as will avoid undesirable slacking of the cables 158.

Fig. 3*a* shows a further feature of the invention, employed where it may be desired to modify the total pressure exerted by the tubes over a local area. For example, it may for some reason become desirable to exert a somewhat increased downward force over certain areas. According to the present invention, this purpose may be accomplished by local modification of the depth of the hose receiving chamber over the selected area. Thus, as in Fig. 3*a*, which illustrates one means for carrying the idea into effect, the depth of the hose receiving chamber has been decreased by the introduction over certain of the hoses of a plank or sheet 165 of the requisite thickness, and which may extend from end to end of the press, or as may be required for the problem in hand. The resulting locally decreased depth of the chamber causes the hoses within the area involved to be more greatly flattened, with greater effective areas pressed against the floor of the chamber. Accordingly, even though the air pressure within the hoses remains unchanged, the total downward force is increased.

I have now disclosed the invention by way of giving a complete detailed description of certain present illustrative embodiments thereof; it will, of course, be understood that this is for illustrative purposes only and that various changes in design, structure and arrangement may be made without departing from the spirit and scope of the invention or of the appended claims.

I claim:

1. In a gluing press, the combination of a support for the article to be glued, a cover over said support, means for elevating and lowering said cover relative to said support, a plurality of heating elements adapted to engage said article on said support, flexible supporting means flexibly suspending said heating elements directly from said cover, a flexible partition carried by said heating elements and suspended with said heating elements by said flexible supporting means, a chamber in said cover for a pneumatic expansion means, pneumatic expansion means in said chamber, said chamber including a flexible bottom wall through which the pressure from said pneumatic means may be exerted downwardly, said flexible bottom wall coming against said flexible partition and said flexible partition and heating elements coming to rest against said article to be glued when said cover is lowered, and means for clamping said cover down in lowered position.

2. In a gluing press, the combination of a support for the article to be glued, a cover over said support, means comprising a plurality of hydraulic jacks acting between said support and said cover for elevating and lowering said cover relative to said support, a plurality of heating elements adapted to engage said article on said support, flexible supporting means flexibly suspending said heating elements directly from said cover, a flexible partition carried by said heating elements and suspended with said heating elements by said flexible supporting means, a chamber in said cover for a pneumatic expansion means, pneumatic expansion means in said chamber, said chamber including a flexible bottom wall through which the pressure from said pneumatic means may be exerted downwardly, said flexible bottom wall coming against said flexible partition and said flexible partition and heating elements coming to rest against said article to be glued when said cover is lowered, and means for clamping said cover down in lowered position.

3. In a gluing press, the combination of a support for the article to be glued, a cover over said support, means for elevating and lowering said cover relative to said support, said means comprising a supporting structure erected over the press, a pneumatic cylinder carried thereby and provided with a piston, and cables operated by said piston and connected to said cover, a plurality of heating elements adapted to engage said article on said support, flexible supporting means flexibly suspending said heating elements directly from said cover, a flexible partition carried by said heating elements and suspended with said heating elements by said flexible supporting means, a chamber in said cover for a pneumatic expansion means, pneumatic expansion means in said chamber, said chamber including a flexible bottom wall through which the pressure from said pneumatic means may be exerted downwardly, said flexible bottom wall coming against said flexible partition and said flexible partition and heating elements coming to rest against said article to be glued when said cover is lowered, and means for clamping said cover down in lowered position.

4. In a gluing press, the combination of a support for the article to be glued, a cover over said support, means for elevating and lowering said cover relative to said support, a plurality of heating elements in the form of parallel steam bars adapted to engage said article on said support, flexible supporting means flexibly suspending said

heating elements directly from said cover, a flexible partition carried by said heating elements and suspended with said heating elements by said flexible supporting means, a chamber in said cover for a pneumatic expansion means, pneumatic expansion means in said chamber, said chamber including a flexible bottom wall through which the pressure from said pneumatic means may be exerted downwardly, said flexible bottom wall coming against said flexible partition and said flexible partition and heating elements coming to rest against said article to be glued when said cover is lowered, and means for clamping said cover down in lowered position.

5. In a gluing press, the combination of a support for the article to be glued, a cover over said support, means for elevating and lowering said cover relative to said support, a plurality of heating elements adapted to engage said article on said support, flexible supporting means flexibly suspending said heating elements from said cover, a flexible partition carried by said heating elements and suspended with said heating elements by said flexible supporting means, a chamber in said cover for a pneumatic expansion means, pneumatic expansion means in said chamber comprising a plurality of parallel flexible hoses of greater normal diameter than the depth of said chamber, said chamber including a flexible bottom wall through which pressure from said hoses may be exerted downwardly when said hoses are inflated and thereby somewhat flattened thereagainst, said flexible bottom wall coming against said flexible partition and said flexible partition and heating elements coming to rest against said article to be glued when said cover is lowered, and means for clamping said cover down in lowered position.

6. In a gluing press, the combination of a support for the article to be glued, a cover over said support, means for elevating and lowering said cover relative to said support, a plurality of heating elements adapted to engage said article on said support, flexible supporting means flexibly suspending said heating elements from said cover, a flexible partition carried by said heating elements and suspended with said heating elements by said flexible supporting means, a chamber in said cover for a pneumatic expansion means, pneumatic expansion means in said chamber comprising a plurality of parallel flexible hoses of greater normal diameter than the depth of said chamber, said chamber including a flexible bottom wall through which pressure from said hoses may be exerted downwardly when said hoses are inflated and thereby somewhat flattened thereagainst, means for locally modifying the depth of said chamber within a selected area and thereby the extent of flattening of certain of the hoses, said flexible bottom wall coming against said flexible partition and said flexible partition and heating elemenst coming to rest against said article to be glued when said cover is lowered, and means for clamping said cover down in lowered position.

7. In a gluing press, a substantially rectangular supporting table on which an article may be supported and adapted to receive such article from an end thereof, a substantially rectangular cover of similar outline supported over said table, means for vertically elevating and lowering said cover relative to said table, a plurality of parallel steam bars disposed transversely of said table and cover flexibly supported from said cover from the two edges of said cover, a flexible partition carried by said steam bars, a chamber in said cover for pneumatic expansion means and including a top surface and a flexible bottom wall, a plurality of flexible pneumatic hoses arranged parallel to one another in said chamber and extending substantially from end to end of said table and cover, said hoses being of normal diameters greater than the depth of said chamber, said flexible bottom wall of said chamber coming against said flexible partition and said flexible heating elements coming to rest against said article to be glued when said cover is lowered, and clamping means extending between said cover and table along the two sides thereof for clamping said cover down in lowered position.

8. In a gluing press, the combination of a support for the article to be glued, a cover over said support, means for elevating and lowering said cover relative to said support, said means comprising a supporting structure erected over the press, a pneumatic cylinder carried thereby and provided with a piston, and cables operated by said piston and connected to said cover, a plurality of heating elements adapted to engage said article on said support, means suspending said heating elements from said cover, a chamber in said cover for a pneumatic expansion means, pneumatic expansion means in said chamber, said chamber including a flexible bottom wall through which the pressure from said pneumatic means may be exerted downwardly, said heating elements coming to rest against said article to be glued when said cover is in a lowered position, and said flexible bottom wall being adapted to exert downward pressure on said heating means in said lowered position, and means for clamping said cover in said lowered position.

EDWARD J. KLASSEN.