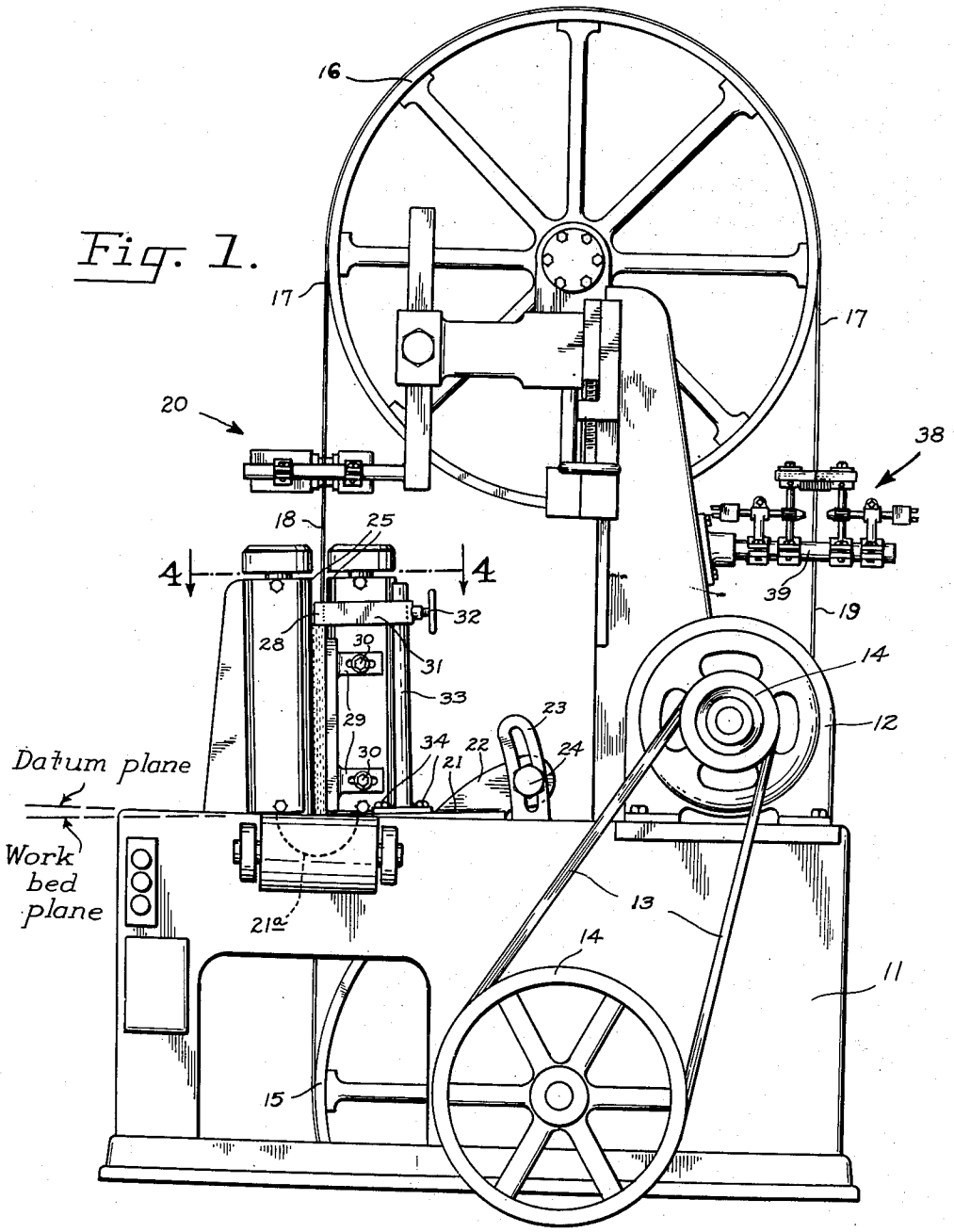
Aug. 3, 1954 E. R. FERRARI 2,685,311

METHOD FOR SPLITTING OR RESAWING INSULATING BOARD

Filed Nov. 16, 1951

4 Sheets-Sheet 1

Fig. 1.



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4 Sheets-Sheet 2

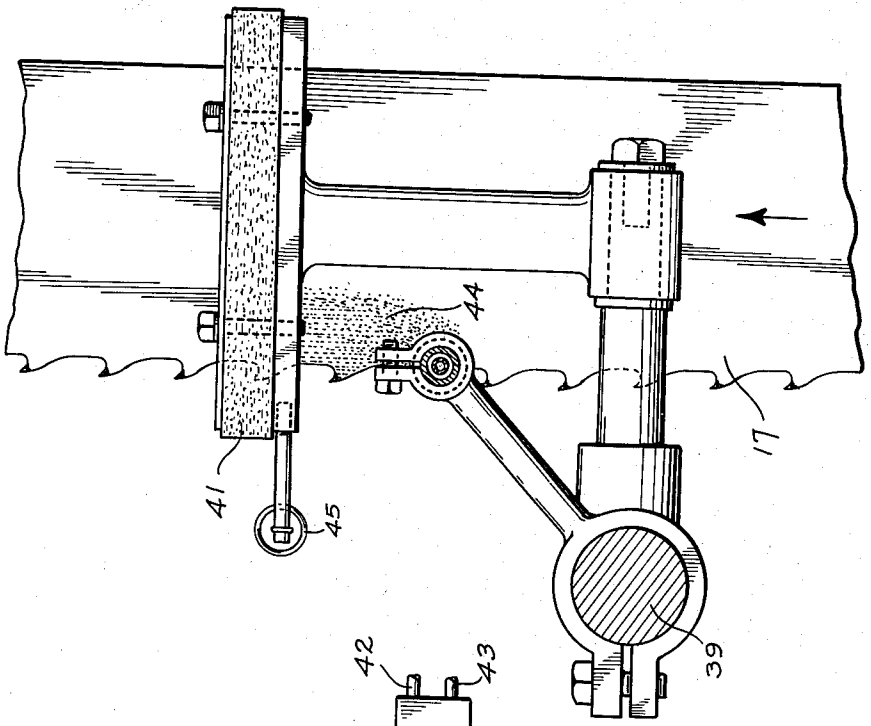


Fig. 3.

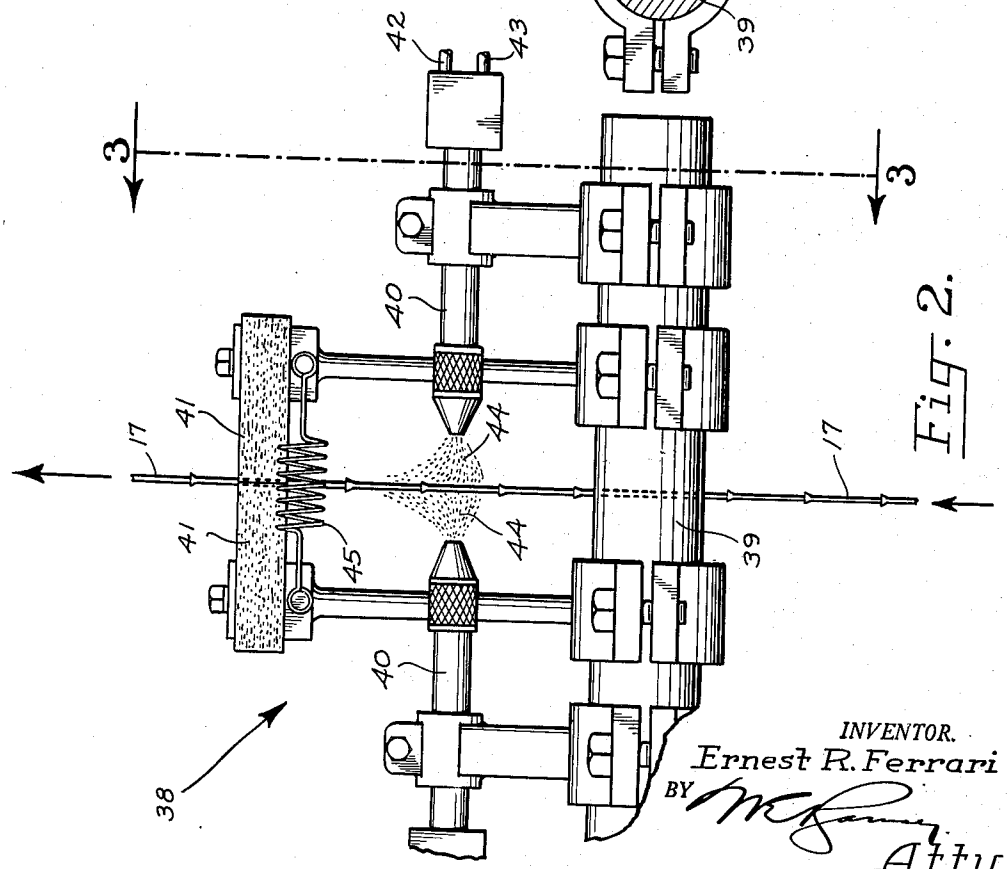


Fig. 2.

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METHOD FOR SPLITTING OR RESAWING INSULATING BOARD

Filed Nov. 16, 1951 4 Sheets-Sheet 3

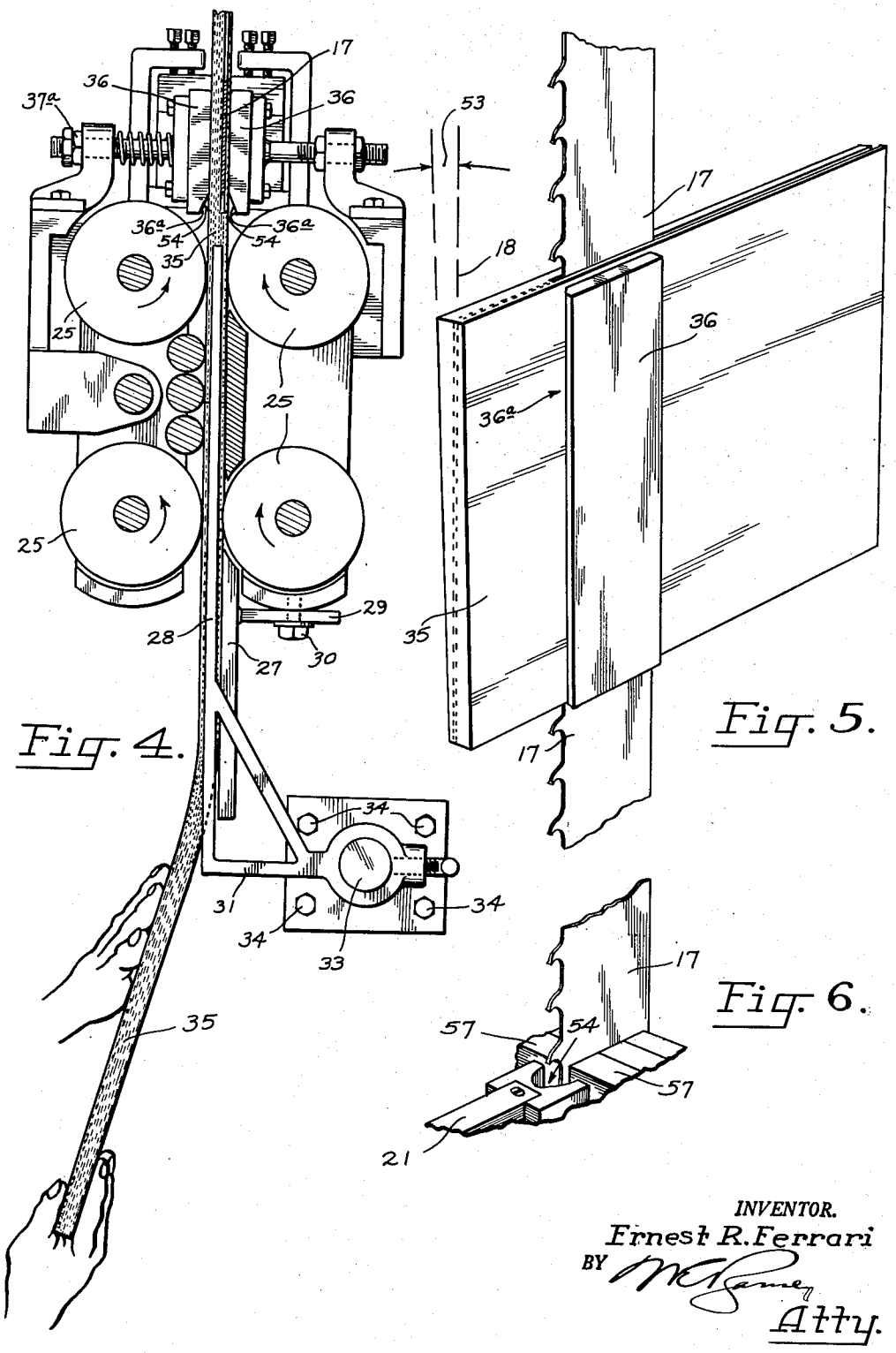


Fig. 4.

Fig. 5.

Fig. 6.

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METHOD FOR SPLITTING OR RESAWING INSULATING BOARD

Filed Nov. 16, 1951

4 Sheets-Sheet 4

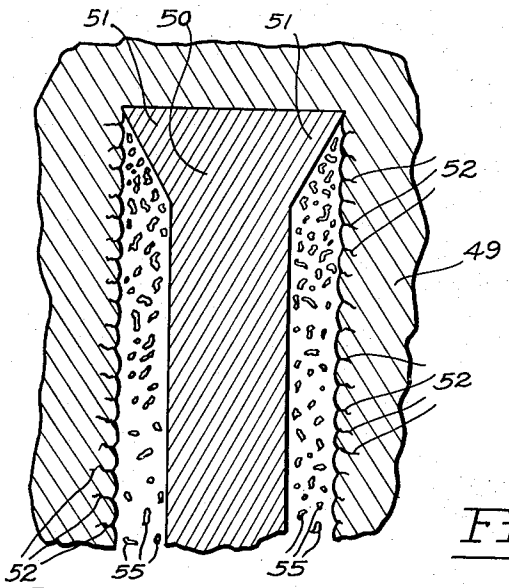


Fig. 7.

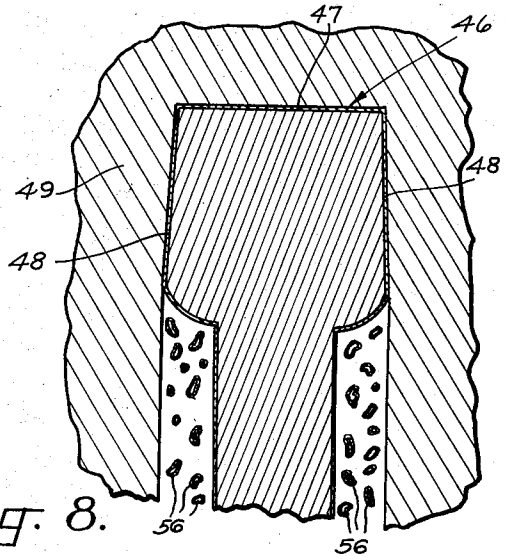


Fig. 8.

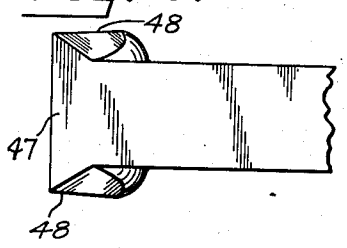


Fig. 9.

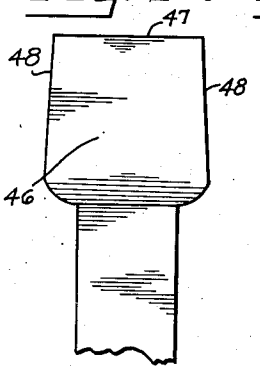


Fig. 10.

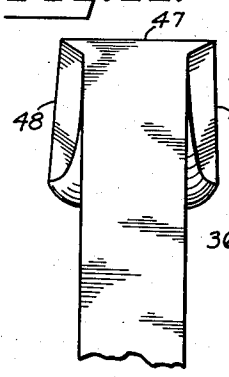


Fig. 11.

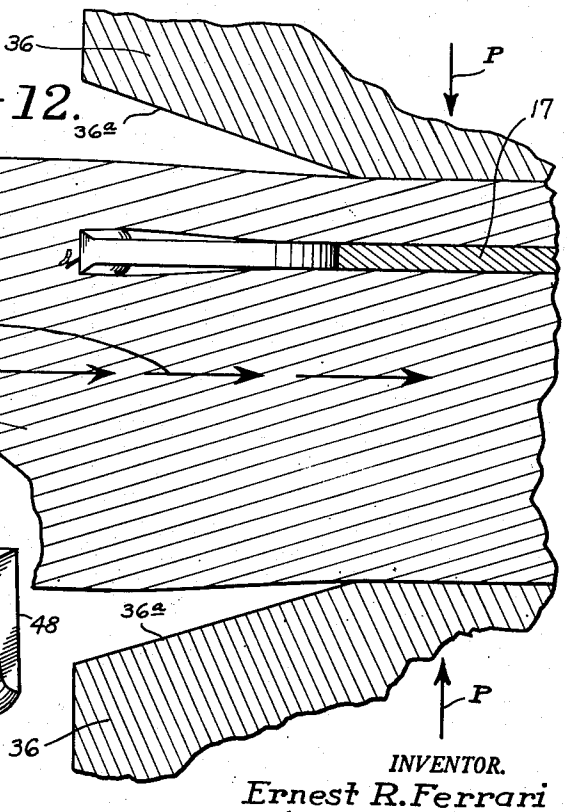


Fig. 12.

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Patented Aug. 3, 1954

2,685,311

UNITED STATES PATENT OFFICE

2,685,311

METHOD FOR SPLITTING OR RESAWING INSULATING BOARD

Ernest R. Ferrari, Vancouver, Wash.

Application November 16, 1951, Serial No. 256,712

4 Claims. (Cl. 144—309)

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My invention relates to the splitting or resawing of insulating board edgewise to provide cut pieces or sections which may be used in the production of simulated split shakes and siding. To this end, the cut pieces or sections should be tapered so as closely to resemble a tapered wood shake or siding. It is difficult, if not impossible, economically, to form insulating board originally in tapered sections. Accordingly, many efforts have been made to resaw or to split the sheets edgewise on a taper to produce two complementary wedge-shaped pieces. These efforts, however, have failed or proven impractical. The difficulty involved is that the sheets of insulating board are quite thin, spongy, soft, and fragile so a splitting or resawing operation cannot be performed economically and efficiently by conventional methods or with conventional machinery. I use the word resaw herein to connote sawing edgewise of a sheet, not flatwise or crosswise and without relation to the fact that the sheet is originally laid or formed without a sawing operation.

Insulating board is formed from a web of matted fiber in a manner similar to the one by which paper is made. Because of the fact that the web is made by flowing or otherwise applying a wetted sheet of material to a perforate surface, it is difficult, if not impossible, to lay such a sheet with a varied thickness or a tapered section. Efforts made to split sheets of insulating board edgewise heretofore have been unsuccessful because of the fibrous, spongy nature of the material and the soft, fragile texture of the finished board. For example, a resaw of usual construction will tear and rip the fibers of the board and will produce an uneven cut surface. Furthermore, to form a simulated shake from a board of standard size, it is necessary to sever the thin edge to an approximate thickness of one-eighth inch. Such a thin edge has little tensile or cohesive strength and the saw blade, as it emerges from the board along such a thin edge, pulls and breaks chunks therefrom so that imperfect sections are produced. Another and greater difficulty and hazard is that conventional efforts to split edgewise or to resaw sheets of insulating board pull out small pieces of material which pile up and wedge about the clearance space for the saw blade or other cutter which is forming the split or kerf, and these pieces produce friction and generate heat to such an extent that ignition of the highly flammable material results. Because of this fire danger, the resaw of an insulating board has become known in the industry as an ultrahazardous undertaking.

I have discovered that sheets of soft insulating board may be split edgewise by the use of a so-called "smooth saw" bandsaw if ordinary resawing procedures are modified in several respects with regard to (1) guiding the sheets into the sawing area, (2) holding them to a fixed plane

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and pathway, (3) compressing the sheets being rived by this sawing action over the area where the sawing is being produced and rearwardly thereof, (4) flooding or wetting the sides of the saw blade with a liquid, such as a solvent, to prevent the binder in the insulating board from accumulating on the blade, and (5) inclining the sheets obliquely to the plane of the saw blade so the usual supports and operating mechanism provided for the saw may be utilized.

My invention is embodied in new methods which make practical and safe the performance of such edgewise splitting or resawing of sheets of insulating material and in a new machine for practicing some of the manipulative steps of the method.

That material which generically is termed insulating board and with which my invention is concerned is produced from a variety of source materials. These source materials, in the main, involve the utilization of waste products, such, for example, as the stocks of sugar cane, corn stocks, flax shives, straw and wood chips. My experimental work has been done in the main with insulating board made from wood chips of Douglas fir and a bitumen binder. One type of insulating board of this latter character is sold under the trade name of Firtex. However, this trade name material is but one exemplary type of insulating board and my invention is intended for use with insulating board generally.

One common attribute of all insulating board is that it is soft and spongy and has little tensile strength as contrasted with hard board. Some insulating board is produced in sheets having relatively smooth, dense surfaces, from a fibrous mass having incorporated therein a resinous or bitumen binder. Some of these binders are quite flammable and most insulating boards exude the binder materials in the presence of heat such as is produced in a resawing action. This exudation, then, is a problem since it tends to form a hard deposit upon the saw blade and, after a short period, the deposit builds up to such an accumulation that it renders the saw blade ineffective for producing a clean cut. Thereafter, either the blade must be removed or the machine must be stopped so the blade can be cleaned. I have discovered that the formation of these deposits and accumulations can be inhibited or prevented entirely by maintaining a wetted surface over the faces of the saw blade as with a liquid solvent or cleaner applied in such volume that it will be taken up by the sawdust produced in the sawing action. This sawdust continuously will wipe the solvent away and will carry with it any accumulation of binder which is exuded from the sheet under the heat produced by the resawing action.

My experiments in connection with this subject have established that the resawing or edgewise splitting of insulating board successfully may be produced with a saw tooth of the type dis-

closed in the United States patent to Ferrari and Hoffman, No. 2,071,618. In the sawing art, this type of tooth is used to produce "smooth sawing." It differs from the ordinary tooth in that the points are more narrow than the base and the sides diverge from the points towards the gullet. Further, the divergent tooth sides are maintained quite sharp so as to plane or shave the walls of the saw kerf to a degree that boards thus sawed resemble planed boards rather than sawed boards.

I have discovered, however, that the use of the above described type of saw tooth alone or per se will not be satisfactory to resaw or to split sheets of insulating board edgewise. The difficulty arises due to the fact that insulating board is quite spongy and it tends to yield under pressure so the divergent sides of the teeth cannot perform their intended function as they do in lumber. This might be likened to the act of a man shaving his whiskers. The whiskers cannot be cut off sharply and cleanly unless some substantial pressure be applied to the skin either by pulling the skin taut or by pressing the razor tightly against the skin. I have discovered that the same effect and result can be obtained in sawing by mounting two flat shoes closely adjacent the sawing area, which shoes are arranged to engage the opposite faces of the insulating board and to hold the board tightly against the saw. These shoes must be relieved somewhat over the area where the teeth rout out the bottom of the kerf so the saw does not become "pinched." They can exert substantial pressure, however, over the gullet of the saw blade and this pressure causes the two halves of the split sheet to be bent inwardly and to rub against the gauge of the saw. Such a slight rub is sufficient to hold the surfaces of the kerf against the saw blade and to produce the shaving or planing action which is so important.

A second and equally important result is produced by the use of these pressure shoes at the sawing area. Thus, the wedge-shaped sections or simulated shakes which are to be produced must narrow to a thin edge, approximately one-eighth of an inch thick. The boards are resawed or are split on edge, however, and the cutter or saw blade moves toward the saw table in passing through the cutting area. Thus, the board is supported by only one thin edge, which edge bears against and rests upon the saw table and lower guide while spanning the tooth clearance opening. It is the fast moving ripping action of the moving saw blade which tends to pull upon this thin edge of the board and of the cut pieces sufficiently to break shunks therefrom. However, in accord with my invention, if the sides of the board and the cut pieces are held tightly by the shoes and a substantial pressure is exerted thereby, the shoes will prevent the thin edges of the cut pieces from crumbling or rupturing. That is to say, the rubbing pressure of the shoes on the thin cut area tends to hold this critical thin edge integral and unbroken, even though the board and cut pieces have only an edge contact for support. The upper edge of the board, on the other hand, does not require as much support since the saw is moving downwardly away from the upper edge. Thus, the entire body of the underlying board acts as a support and rupturing does not occur so readily. That is, the material itself has sufficient strength to resist breakage along the upper edge during the sawing operation.

For the above reasons, it is one object of my invention to provide a pair of spring pressed and parallel mounted shoes for a bandsaw machine, such shoes to be positioned on opposite sides of the saw blade where they will contact, hold, and press the cut pieces of board as these cut pieces flow past the saw blade. In contrast to mere guides, these shoes press upon, compress, and support the cut pieces effectively to strengthen the same at the critical areas.

Another object of my invention, expressed as one of the steps of a method for splitting or resawing insulating board, is to hold and press the cut pieces together, with a preselected pressure, as these pieces move past the gullet line and the rear portion of the saw blade.

In conjunction with the "smooth saw" teeth above mentioned, my invention employs a tunnel which is complementary to the shape of the board which is to be split in practicing my method. This tunnel is unique in that it is bounded by power driven elements which move the board toward the saw and by guides, fences, and idlers, which steer and guide both faces and both edges of the board with precision while it is moved. Additionally, the tunnel is tilted with respect to the saw blade so the board will encounter the teeth at an angle rather than straight on and the cut pieces therefore will acquire the desired taper or wedge-shaped appearance to simulate shakes or siding. Sequentially, then, the method portion of my invention proceeds by moving a plurality of the boards through the tunnel and past the saw blade, one after another, in a steady stream; by abutting each board end to end as it is moved along; and by supporting and holding the cut pieces together with a preselected pressure as they pass the saw blade. Commercially, this method has proven practical and near perfect cuts can be made so long as the insulating board is of the type which employs no binder. If, however, as is common with many insulating boards, a low melting point bitumen or resin binder has been used in forming the board, experience has shown that this binder will present an additional problem. Thus, friction is developed as the splitting or resawing progresses and this friction heats the saw blade to a temperature where the bitumen or resin binder is exuded. As previously explained, a certain amount of this material will accumulate upon the teeth and upon both faces of the saw blade. For example, if a band resaw blade is utilized to practice my method, substantial heat is generated adjacent the work area of the blade, yet only a portion of this heat is dissipated adjacent the return area of the continuous saw blade. Accordingly, that binder which is exuded, tends to harden and to accumulate as the blade moves along and is cooled. Such an accumulation of binder can be fatal to the successful practice of my method. Further, experience has shown that conventional saw "oils," designed primarily to lubricate, do not solve this problem satisfactorily. Accordingly, a second important factor in the practice of my inventive method is that step wherein the saw blade continuously is flooded, wetted, and bathed with a liquid. This liquid may be a solvent which acts as a vehicle for the binder, it may be lower fraction oil which acts as a coating, or it may be another wetting agent. In any event, the binder must be carried away with the sawdust so a clean saw blade is, at all times, maintained.

A further object of my invention is to provide, in combination with a bandsaw machine for splitting a thin sheet of cellulose fiber board, a spray type dispenser means which will bathe both faces of the saw blade with a liquid and which, because of the concentric nozzle structure employed, will

do so more efficiently and effectively than those mechanisms heretofore employed.

Yet another object of the machine portion of my invention is to provide a frame member having a flat area defining a datum plane, a continuous bandsaw blade which intercepts said datum plane at right angles adjacent two spaced areas, the first such area to define a saw work plane and the second to define a return plane, a work bed which is rotatably adjustable with respect to the bandsaw blade, and a plane work feed tunnel for the boards. More particularly, the work bed and plane work feed tunnel above defined are tilted at an angle to the datum plane and the saw work plane, respectively, so the insulating board which is fed through the tunnel will be cut at an inclined angle to produce two tapered pieces which are wedge-shaped.

Another object of my invention is to provide, in combination with a work bed, a plurality of work guides, fences, and power driven feed rolls which are aligned with precision and accuracy in pairs and which are spaced one from another to bound a plane work feed tunnel of the same width and thickness as a board which is to be split or resawed. This tunnel serves to steer and to guide the board in a unique manner since it bounds, bears upon, and engages the top, the bottom, and both faces of the board.

The above and other objects, capabilities, and advantages inherent in and encompassed by my invention will become apparent from the ensuing description, taken in conjunction with the accompanying drawings, wherein:

Fig. 1 is a side view of a woodworking bandsaw machine embodying the various novel features of my invention;

Figs. 2 and 3 are related front and side views, Fig. 3 being taken substantially on the line 3—3 of Fig. 2, showing the spray type dispenser means which floods or bathes the saw blade with a liquid or solvent and showing the two part fabric wiper which is spring biased to contact the faces of the saw blade and spread and wipe the liquid or solvent thereover;

Fig. 4 is an enlarged detail view, taken substantially on the line 4—4 of Fig. 1, showing two sheets of soft insulating board being moved along the feed tunnel which is defined and bounded by a plurality of guides, rolls and fences;

Fig. 5 is a perspective view showing a sheet of the insulating board with the saw blade in the kerf, one of the pressure shoes here being shown in correct position bearing against the side of the board (the other pressure shoe is not shown in this view);

Fig. 6 is a perspective of the saw blade, lower guides, and bed with the board removed;

Figs. 7 and 8 are related enlarged and somewhat diagrammatic cross-sectional views looking down through a kerf as it is cut by a conventional saw tooth and by a scraping type saw tooth, respectively, Fig. 7 illustrating conventional or prior art. These two figures indicate, in comparison, the fissure ridden, rough, torn kerf produced by the conventional tooth and the smooth surfaced, clean kerf produced by the "smooth saw" tooth;

Figs. 9, 10, and 11 are related top, front and back views, respectively, showing one form of the tapered or scraper type tooth with which the method of the instant invention is practiced; and

Fig. 12 is an enlarged detail view which is more or less diagrammatic and which is taken in cross-section through a sheet of insulating board with the saw in the kerf and with the pressure shoes bearing tightly against the sides of the board so the thin edge will not crumble or break off.

In Fig. 1, I have shown a more or less conventional single blade band resaw machine with which I have embodied the principles and novel elements of my invention. This machine includes a main frame member 11 having the usual horizontal flat top area defining a datum plane. This datum plane is so labeled in Figure 1. An electric motor 12 is mounted upon the flat top of the frame member and is joined, by a belt 13 and two pulleys 14, to the lower or power saw wheel 15. This power wheel 15, in turn, is mated to an upper or idler saw wheel 16 and a continuous bandsaw blade 17 is reeved thereover. Thus, the bandsaw blade 17 is power driven to intercept the datum plane at right angles adjacent two spaced areas. The first such area I define as a saw work plane (see 18 wherein the blade moves down) and the second I define as a return plane (see 19 wherein the blade comes up). As is conventional, the work or boards are fed across the saw work plane 18 to intercept the blade and no work is done in the return plane 19.

As more particularly is described in my copending application entitled Band Saw Guide, filed November 16, 1951, Serial No. 256,714, the instant machine may be equipped with the mated inner and outer halves of a bandsaw guide 20. Further, the work bed 21 of the resaw machine rotatably is adjustable, upon a journal bearing 21*a*, with respect to the aforementioned datum plane. Such rotational adjustment takes place about a journal bearing axis which lies within the datum plane and within the saw work plane 18, the axis being located in a direction perpendicular to the plane of the drawing of Fig. 1. In conjunction with the rotational adjustment, the work bed carries a massive ear 22 which cooperates with a slotted slide 23 and a bolt 24 to adjust and to set the angle between the plane of the work bed and the datum plane. This angle, as indicated in Fig. 1, is a small acute angle for the purposes of the instant invention so that tapered pieces will be cut from a rectangular board.

In comparison of Figs. 1 and 4, the work bed 21 carries a plurality of work guides, fences, and power driven and idler feed rolls which protrude thereabove for adjustment about the journal bearing 21*a* with the work bed. These elements include four power driven feed rolls 25, a two piece vertical or side fence or guide 27, and a top or horizontal guide or fence 28. Both of the guides or fences 27 and 28 are mounted for adjustment as desired. Thus, the side fence 27 is joined to a vertical extension of the work bed 21 through a pair of arms 29 and a companion pair of bolts 30. These bolts slide within complementary slits which pierce the arms. Similarly, the top guide or fence 28 is carried by a protruding strap 31 which terminates in a circular slide having a tightening bolt 32 which is adapted to grip the complementary upstanding pipe 33. Thus, since the pipe 33 is joined to the work bed 21, as by bolts 34, and since the various rolls and the side fence 27 also are carried by the work bed 21, rotation of the latter will cause these elements to tilt or rotate the same amount. In summary, then, the various fences, guides, and rolls may be said to define a plane work feed tunnel which is adjustable in size and which is best made to conform, in a complementary manner, to the size of the board which is to be sawed. The rolls and

side fences grip the two sides of a board, the top fence slidably guides the top of the board, and the work bed guides the bottom thereof. Further, because the various adjustments are provided, the boundaries of the tunnel can be set to a small fraction of an inch. Such accuracy is important to my invention.

In Fig. 4, another important feature of my invention is shown. Thus, there is shown a pair of insulating boards in the process of being fed, by the hands of a sawyer, through the aforementioned feed tunnel and against the bandsaw blade 17. These boards, in accord with an important factor in this invention, are an insulating board which, because of its soft, spongy and weak nature, is very difficult to split. Both of the boards are identified by the numeral 35 and, as they flow through the work tunnel, the various guides and fences bear upon the top, the bottom and both faces thereof. Furthermore, as the boards actually are being sawed by the blade 17, a pair of flat pressure shoes 36 bear upon and support the outer surfaces of the board and the cut pieces with a compressive force. This compressive force is generated by an adjustable compression spring 37 which is held intermediate one of the pressure shoes and the secondary frame member supporting the shoe. The spring force is adjusted by a threaded nut system 37*a*. As best is shown in Figs. 4 and 12, each of the flat shoes 36 has a tapered end 36*a* so, in effect, a funnel is formed. Further, the entire shoe extends upwardly to a point closely adjacent the top of the board and it extends rearwardly substantially the width of the saw blade. Thus, the cut pieces of the boards 35 are pressed tightly together as they pass over the saw blade. By this pressing action, the shoes 36 serve two separate functions. Firstly, they support the cut pieces to prevent crumbling and, secondly, they amplify and support the shaving and planing action of the saw teeth as hereinafter will be explained with reference to Figs. 9, 10 and 11. In use, these functions are evidenced by a slight lateral movement of the nut system 37*a* each time a board passes between the shoes 36. Thus, the pressure shoes 36 and the method steps which these shoes, mechanically, will practice both form an important part of my invention.

Further to illustrate the structure and function of the pressure shoes 36, I have provided the enlarged diagrammatic view of Fig. 12. In this figure, the arrows F indicate the direction in which the board 35 is fed against and past the saw blade 17 and the arrows P indicate the direction in which the pressure shoes 36 exert a force against the sides of the board. By way of example, I have found that a total force (P) of about 10 pounds is sufficient to support a sheet of Firtex insulating board which is one half inch thick, 16 inches high and four feet long. Thus, the board itself is quite spongy and yieldable in contrast to lumber or hardboard. Consequently, the teeth of the saw blade are attempting to rip and to plane a material which gives, under pressure, much as a piece of cardboard would give. I counteract this give by supporting the board with the pressure shoes. On the other hand, the shoes 36 cannot press inwardly at a point opposite the saw teeth or the saw will "bind" and overheat. This danger points up another reason for forming the shoes 36 with the tapered, cutaway portions 36*a*. In short, the shoes must be provided to support the cut pieces rearwardly of the gullet line and along the sides of the blade so the sawing can proceed, but they also must be relieved or tapered opposite the teeth so the sawing can continue.

Yet another function is served by the pressure shoes 36. Thus, as is well known in the sawing art, that portion of the bed of the resaw machine which is located directly below the tooth and gullet structure shown in Fig. 12 is relieved or cut away to provide an opening (54, Fig. 6) through which the blade and the teeth may pass. Consequently, a majority of that portion of the board which is shown in Fig. 12 is unsupported from beneath. However, this same portion is the most critical area in the entire weak, spongy board. This is for the reason that the blade 17 is moving down through the unsupported area and the teeth are pulling upon and ripping the kerf over this area. With conventional methods of sawing, this pull will break off and crumble the thin lower edge of the board and imperfect pieces will result. In practice of my method, however, a lateral support pressure is exerted against the sides of the board. This support may be provided by the pressure shoes 36 or by an equivalent structure. In any event, by holding the cut pieces together against the saw blade directly behind the teeth, a support is provided to counteract a certain amount of the tooth pull. This support, then, is in addition to that support which resists the lateral give of the spongy material and it is an important part of my invention.

Returning now to a comparison of Fig. 1 with Figs. 2 and 3, the latter are enlarged detail views of the spray type dispenser means 38 which is mounted in the return plane 19 of the saw blade. Thus, a long horizontal mounting rod 39 protrudes from and is carried by an upstanding rear portion of the main frame member 11. Four separate clamps encircle and grip this rod 39. As shown in Fig. 2, two of these clamps carry the mated concentric nozzle structures 40 whereas two more carry the complementary halves of a fabric wiper 41. The nozzles 40 are aimed or directed at the front of the saw blade 17 adjacent the gullet line of the teeth. The fabric wipers 41, on the other hand, contact the entire lateral area of the saw faces. Thus, each nozzle includes a liquid supply hose 42 and an air supply hose 43. As indicated in Fig. 3, air under pressure is emitted from the outermost or annular nozzle whereas liquid, such as the aforementioned solvent or oil, is emitted from the central or circular nozzle. In effect, this provides an atomizer action which breaks up the small drops of liquid to form a fine mist or spray as indicated diagrammatically at 44. Further, as shown in Fig. 3, this spray 44 contacts the saw faces just below the two fabric wipers 41. Since the wipers 41 are spring biased into contact with the saw faces, as with a spring 45, the fabric soon becomes wet or impregnated with the liquid and the entire lateral area of the blade is wiped, flooded or bathed with a uniform coating of the liquid. By way of example, if the binder in the board is a bitumen, the liquid should be a solvent which is a lighter fraction of the same source material. On the other hand, I have tried water as a wetting liquid. In any event, the wetting agent should wet or flood the sides of the blade completely so a coating is provided. If this coating is thorough and complete, the binder material which is exuded from the board will not stick to the blade. Instead, the binder will be wiped off by the sawdust during the sawing operation. Further, a certain amount of the liquid also will be wiped

off and it is for this reason that an efficient spray type dispenser should be used.

Turning now to Figs. 9, 10, and 11, I have shown a typical shaving or planing tooth which is capable of producing the "smooth saw" results previously described. This particular form of the tooth is made with a relatively flat face 46, a straight top 47, and with divergent planing edges 48. In function, the straight top edge 47 of the tooth serves initially to rout out a narrow kerf in a board and the divergent edges 48 widen the kerf to its eventual width by planing and dressing the walls defining the kerf. The taper which produces the divergent edges may vary from zero to .005 inch or more depending upon the action desired.

This function of a shaving type tooth best is illustrated in Fig. 8 where a cross-section of the tooth is shown as it forms a kerf in a soft cellulose fiber insulating board 49. Thus, the narrow straight top 47 of the face 46 is routing out the floor of a kerf through the board and the divergent edges 48 are planing, shaving, and dressing the walls defining the kerf. In Fig. 7, on the other hand, a conventional saw tooth 50 is forming a kerf in a similar soft fiber board 49. In this latter figure, the tooth edges 51 are ripping and tearing out the fibers. Because the conventional tooth 50 has no shaving, or planing action, the sides of the kerf are not smooth as in Fig. 8. Instead, the edges 51 are tearing, gouging and ripping without smoothing. Fig. 7 is diagrammatic and is enlarged considerably to show the rough saw kerf as it would appear under a microscope. Thus, according to studies I have made, the conventional saw tooth actually loosens and detaches the cellulose fibers and splinters from a thin layer underlying the surface of the kerf. This pulling and tearing of the fibers makes rupture lines 52 which, when the saw approaches the thin edge of a cut, break off and actually cause the edges of the board to fracture, crack and give way. As shown in Fig. 8, on the other hand, the planing action of the divergent edges 48 on the smooth sawing tooth, shaves and dresses the surfaces of the kerf and minimizes the rupture lines 52. Further, the planing action of the edges 48 serves to shave off rather than to tear and pull the minute fibers or splinters which are present in the soft board 49. The overall kerf width, however, is the same in both Figs. 7 and 8 since the effective tooth widths are identical.

Turning now to Fig. 5, I have shown a soft cellulose fiber insulating board 35 in the process of being resawed or split edgewise and at a taper by the saw blade 17. Because the aforementioned datum plane and the saw work plane 18 are perpendicular, one to another, whereas the work bed plane and the plane of the work feed tunnel and the board also are perpendicular, one to another, the angle 53 of Fig. 5 is equal to the acute angle which is shown in Fig. 1 between the datum plane and work bed plane. This small acute angle produces the desired taper in the board 35 as it is split and the structure bottoming the same is an important part of my invention.

Fig. 6 likewise has been enlarged somewhat and the board has been removed to reveal the opening 54 through which the saw blade 17 passes as it travels down below the flat shoes 36. This opening is bounded by a fork which is an extension of the work bed 21 and by the two lower guides 57 which are conventional in a resaw machine. Thus, Fig. 6 serves to illustrate one of the important differences between my inventive method and the methods heretofore practiced in attempting to split or resaw an insulating board. For example, Fig. 7 illustrates how the conventional saw tooth breaks off and tears out rather large pieces and chucks of the board 55. These pieces and chunks pile up and accumulate in the opening 54 and soon cause the saw blade 17 to run "hard." After a period of time, enough friction is created adjacent the clogged opening 54 to cause the material from the board to burst into flame. The danger of fire is even more enhanced if the binder material is flammable. With the tooth of Fig. 8, the pressure shoes 36, and the spray type dispenser previously mentioned, however, the sawdust particles 56 are somewhat smaller than those created with the conventional saw tooth. Further, since the board is not broken or chipped in the kerf and along the thin edges, no large chunks are produced to clog the opening 54. Additionally, the minute sawdust particles 56 are coated with the liquid which has been carried on the blade 17 and which originated with the spray type dispenser 38. Thus, with my machine and in the practice of my method, the opening 54 does not clog up, no fire hazard is presented, and that binder which is released from the board immediately is wiped away by the sawdust.

In use, the bandsaw machine of Fig. 1 is started up and the spray type dispenser 38 is turned on. Thereafter, the insulating boards 35 are fed to the rectangular feed tunnel which is defined by the power driven feed rolls 25, the side fences 27, the horizontal top guide 28, and the work bed 21. As a board is moved against the saw blade 17, the flat pressure shoes 36 grip the side faces thereof, compress the board, and hold the cut pieces against the sides of the saw blade, firstly, to help produce the desired shaving and planing action with the divergent edges 48, and, secondly, to keep the thin edge of the board from crumbling. Further, if the boards 35 are made with a binder such as a low melting point bituminous binder, the heat of the sawing action tends to cause the binder to exude. However, because the spray type dispenser 38 has coated the saw faces with a liquid, little, if any, of the binder will stick to either the blade or the teeth. Instead, the liquid and the sawdust will act as vehicles or carriers to scrape away and wipe off the binder as is illustrated diagrammatically in Fig. 8.

In summary, the method of my invention relates to insulating board of the type which is formed in thin rectangular sheets of more or less uniform thickness from a fibrous material and a bitumen or other binder. Because of the factors heretofore explained, this method is of outstanding usefulness when the thickness of the board does not exceed one half inch. In this latter case, the tensile and cohesive strength of the board is so limited that conventional methods and machines cannot split the board without cracking off large pieces and without starting a fire. With my method and improved machine, however, these boards may be resawed or split edgewise with no cracking or danger of fire. Further, the plane of the saw kerf will be related to the planes of the rectangular sizes of the board and it will be inclined at a small acute angle thereto (see Fig. 5) to produce two tapered pieces in each of which the most thin margin will be approximately one eighth inch thick. As

those skilled in the sawing art know, it heretofore has been impossible or highly impractical to split a sheet of this weak spongy material to such a thin edge.

For example, my method will operate upon a piece of Firtex four feet long, 16 inches high, and one-half inch thick to saw therefrom two tapered pieces having a butt approximately three eighths inch thick and a shank end approximately one eighth inch thick. The length and width of the tapered piece, of course, are unaffected. Given such a board, my method includes the provision of a continuous saw blade having teeth with divergent edges. Further, a plurality of fence and guide means are provided on the feed side of the blade and beside the blade for holding and guiding the top, bottom, and sides of each sheet as it approaches the blade and the bottom and sides as the board actually is being sawed. Further, the sides are pressed and held together as they pass over the saw blade. Still further, a constant velocity feed mechanism is provided to feed each board past the fence and guide means and to the saw blade. To produce the tapered pieces, the feed mechanism and the fence and guide means are inclined at an acute angle or tilt to the saw blade as previously explained. Sequentially, the steps of the method include coating or wetting both surfaces of the saw blade with a liquid so that binder which is caused to exude by the heat of the sawing action will be wiped away by the sawdust. Continuing, a plurality of the rectangular boards are fed, edgewise, one after the other, to the feed mechanism and saw blade in a constant stream and at a constant velocity with the end of each board in abutment with the following board. Finally, the cut tapered pieces are held together with a light compressive pressure until they are well past the gullet line of the saw teeth so the planing action of the teeth is enhanced and splitting, crumbling and cracking are prevented.

With the bandsaw machine of my invention, on the other hand, I have provided a frame member having a flat area which defines a datum plane, a continuous bandsaw blade which is power driven to intercept the datum plane at right angles adjacent two spaced areas. These areas are a saw work plane across which the boards are fed and a return plane in which no work is done. Further, the bandsaw machine carries a work bed which is rotatably adjustable with respect to the bandsaw blade. A plurality of work guides, fences and power driven feed rolls are mounted upon the work bed and are aligned in spaced pairs to bound, in outline, a plane work feed tunnel of the same height and thickness as the boards which are to be sawed. The work feed tunnel is inclined at an angle to the datum plane and to the plane of the saw. Further, the tunnel terminates adjacent the novel pressure shoes. Finally, the bandsaw machine is provided with a dispenser means which sprays and spreads a liquid over both faces of the saw blade as the latter passes through the return plane. Cumulatively, these improvements provide a method and a machine with which insulating board can be resawed or split edgewise without chipping, cracking, crumbling or catching on fire.

I claim:

1. A method for separating edgewise a flat sheet of insulating board so the two sections are complementary wedge-shaped pieces, said method including splitting and simultaneously scraping the sides of the separating cut within a closely defined area, guiding said sheet through a closely encompassing way to the splitting area at an oblique angle, moving said sheet along said way and through said splitting and scraping area at constant velocity, and holding the cut pieces together with a preselected pressure as they pass through and beyond said area.

2. In that art which relates to insulating board of the type which is formed in thin rectangular sheets from a cellulose mass mixed with the binder, a practical commercial method for resawing a plurality of these sheets to produce two thin pieces having the same length and width as the original sheets, said method comprising: simultaneously forming a saw kerf and planing the sides of said kerf, inhibiting the accumulation of the binder material upon the faces of the kerf forming tool by flooding and coating said faces with a liquid, bounding and defining a closely encompassing way leading to the kerf forming tool, feeding said insulating board along said way by moving a plurality of these sheets along said way in endwise abutment with each other, and holding the split pieces of board together with a preselected compressive force applied just rearwardly of the area being sawed.

3. A method for the edgewise separation of an elongated, flat sheet of soft insulating board, said method comprising: providing a continuously moving cutting agency, inhibiting the accumulation of solids upon said cutting agency by flooding a liquid thereover, bounding and defining a closely encompassing way leading to the cutting agency, moving a sheet of insulating board along said encompassing way and against said solvent covered cutting agency at a constant velocity, and holding the cut pieces together with a compressive force until they pass beyond the cutting agency.

4. A method of separating a flat rectangular sheet of insulating board by cutting obliquely through the board edgewise so the two cut sections are complementarily tapered pieces having the same width and length as the original board, said method comprising: providing a dual function kerf forming agency which will form and scrape the sides of the kerf in immediate sequence, providing a closely encompassing way of rectangular outline leading to the kerf forming and scraping agency, but tilted with respect thereto, continuously flooding the kerf forming and scraping agency with a liquid to inhibit the accumulation of solids thereon, moving said sheet through said way and against said kerf forming agency at a constant velocity, and, at the same constant velocity, removing the tapered cut pieces from the kerf forming agency.

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