

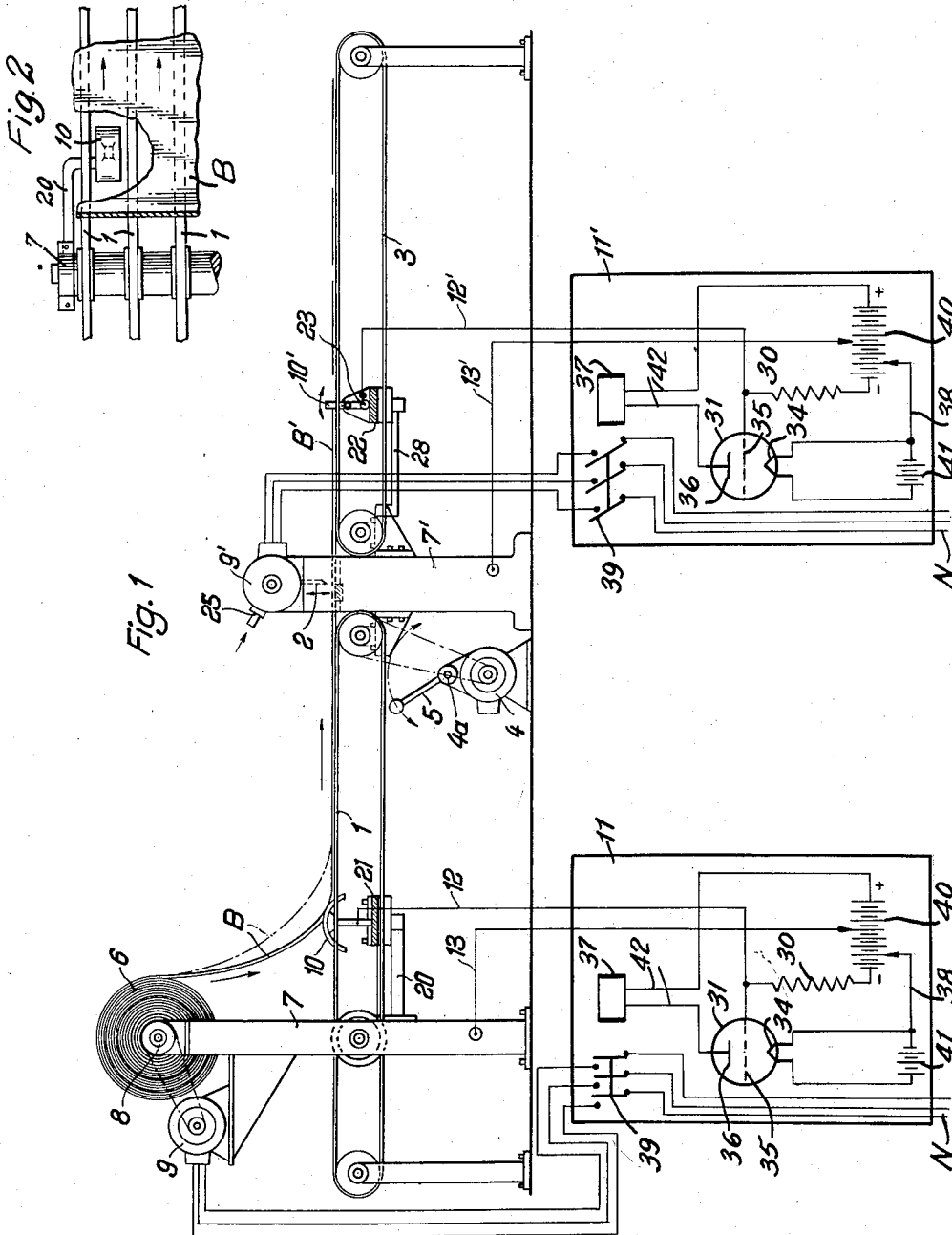
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APPARATUS FOR THE AUTOMATIC CONTROL OF WORKING OPERATIONS
AT MOVING PLATE-LIKE, SHEET-LIKE, OR BAND-LIKE
ELECTRICALLY NON-CONDUCTIVE MATERIAL

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APPARATUS FOR THE AUTOMATIC CONTROL OF WORKING OPERATIONS AT MOVING PLATE-LIKE, SHEET-LIKE, OR BAND-LIKE ELECTRICALLY NON-CONDUCTIVE MATERIAL

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The present invention relates to a method for the automatic control of working operations on moving plate-like, sheet-like, or band-like material, such as rotary cut veneer sheets or bands, veneer plates, molded fiber board or the like.

The automatic control of the working operations may consist in any kind of action affecting the moving plate-like, sheet-like, or band-like material, for example the switching on or off of conveying means, or the switching on or off of cutting means or of other mechanically working tools.

While hereinafter the invention will be described as applied to the clipping into pieces of a moving sheet of veneer, it should be understood that the invention is not confined to this particular field of application.

It is a fact known in the art that the veneer conveyed to veneer clippers at uniform speed is worked by the clippers at non-uniform, varying speed. This makes it necessary to devise the construction in such a way that the driving means actuating the conveying means of the veneer band are automatically switched on and off by end contacts, or the like, in combination with relay switches. Mechanically operated end contacts of this kind usually require the working material itself to perform a mechanical switching action, of which it is incapable however, because of its structure. In addition, the contact release becomes effective at the driving means to be controlled only after a considerable time. Controlling means of this kind are, therefore, not suitable in cases in which quick working actions are needed.

There are further known controlling methods of the type in which the working material is scanned by the light-ray of a photo-electric cell. However, methods of this kind are unsuited for use at places where rough work has to be done, as the contact means are highly sensitive to light and sensitive in every respect, and for that reason have to be carefully protected against dust, dirt and shocks, so that their use at places of the kind in question is precarious and unreliable.

The problem to be solved by the invention is to disclose a controlling method in which the working materials are not employed for the mechanical release of the contact and in which contact is effected at the driving means to be controlled without loss of time. The working materials in question, for example veneer sheets, molded fiber board etc. are electrically non-conductive.

The concept of releasing a controlling contact solely through contact with working material, has therefore not been obvious, in this case by no means a very natural one.

The invention resides fundamentally in the discovery that the electrically non-conductive materials, such as veneer, molded fiber board, etc., contains at the time when they are worked, a certain percentage of moisture which renders it possible to impose upon these materials an electric potential by means of which the material

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changes, through mere contact, the grid potential of a thermionic tube. The alteration of the anode current thus produced can then be used for the control of subsequently connected organs, such as relays, magnets or electronic switching means (thyatron, ignitron or the like), for switching a driving element on or off when the working material contacts a contact feeler, or for switching the driving element on again when the contact is broken.

In the practical embodiment of the inventive idea, the working material is connected via the machine frame with a potential opposite to that of the grid of the thermionic tube, while the grid itself is connected with a contact feeler rigidly or movably arranged at the machine frame in the path of the working material, with insulating material interposed between the contact feeler and the machine frame.

In a control system of this kind, the working material need not act as a mechanical switching means. Furthermore, stable- and wear-resisting contact feelers can be used, and the electronic relay can be so devised that contact is effected practically without loss of time and effective power.

The invention will be best understood from a consideration of the following detailed description taken in connection with the accompanying drawings, forming a part of this specification and in which an embodiment of the invention has been shown by way of example. However, I wish it understood that the invention is not confined to any strict conformity with the showing of the drawings, but may be changed or modified, so long as such changes or modifications make no material departure from the salient features of the invention as defined in the appending claims.

In the drawings:

Fig. 1 is a diagrammatic side elevation of the veneer clipper;

Fig. 2 is a partial top view of the conveying belts on which the material is conveyed to the clipping knives.

The endless conveying means 1, for example rubber belts convey the veneer sheet or band B, running off the reel 6 supported on the frame 7, to a veneer clipper 2, from which the separated veneer pieces or plates B' are carried off by sorting belts 3. The conveying belts 1 are driven from the motor 4, the speed of which is adapted for regulation (for example infinitely variable regulation) by means of a regulating member 4a known per se provided with a manually actuatable control lever 5. The veneer band B is thus fed to the clipping knife 2 at a conveying speed at which it is possible for the operator to cut it, whereby the conveying speed constantly changes, as more or less frequently, faulty portions have to be cut out, and as for that reason the material frequently has to be cut up in pieces of constantly varying sizes depending upon the quality of the wood. In order to utilize the material as best as possible it may further from time to time be necessary to cut the veneer while the machine is standing still. Therefore, the veneer band B has to be fed to the clipping knife 2 in such a manner that the latter is capable of handling it. The veneer band B is reeled up as shown at 6 and supported on the frame 7 above the conveying belts 1. The shaft 8 of the reel 6 is driven from a motor 9 at uniform speed.

Fastened on a supporting arm 20 of the frame 7 in the area of the conveying belts 1 and between the latter is a stationary feeler member 10, with an insulating plate 21 between feeler 10 and the supporting arm 20. The feeler 10 is connected with the grid potential 12 of the thermionic tube of an electron relay 11.

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The veneer band B is connected via the frame 7 with an opposite potential 13. The electron relay 11 regulates the driving motor 9 of the reel 6 either for unreeling or for brake action. In its position of rest (see full line position) the veneer band B touches the contact feeler 10, whereupon the change of potential thus produced regulates the unreeling motor 9 via the electron relay 11 for brake action. When the conveying belts 1 again start to feed the veneer band B toward the clipping knife 2, the veneer band moves away from the contact feeler 10 into the dot-and-dash line position. In this way it is possible to unreel through fully automatically working control means always just so much veneer band from the reel 6 as can be handled by the clipper 2.

In a similar way, it is possible to control with the aid of movable contact feelers 10' the actuation of the clipper 2 even from the side of the sorting belts 3. For this purpose there is arranged between the conveying belts 3 (in the same way as has already been described for the stationary contact feeler 10 between the conveying belts 1) in the path of the veneer a movable contact feeler 10' on a supporting arm 23 of the clipper support 7', an insulating plate 22 is being interposed between the contact feeler 10' and arm 23. The contact feeler 10' is tiltable and normally maintained in upright position by the balance weight 23. The tiltable contact feeler 10' is connected with the grid circuit 12' of the electronic relay 11', regulating the driving motor 9' of the clipper 2, while the veneer plates B' are connected via the clipper support 7' and the clipping knife 2 with the tap 13' of the battery 40 of the electronic relay 11'.

An arrangement of this kind enables the clipper to function as follows:

When the tiltable contact feeler 10' is in the upright position illustrated in the drawings, it connects the motor 9' of the clipper 2 via the electronic relay 11' for "stop." When, thereupon, the tiltable contact 10' is tilted by the end of the veneer band B' moved through the machine by the conveying belts 1, it connects the motor 9' of the clipper 2 for "action."

When the end of the veneer band B' has been severed from the veneer band B (the separating gap can be somewhat enlarged by increasing the speed of belt 3 as compared with that of belt 1), the separated veneer band end B' still resting on the tilted contact 10' has no longer the potential 13' originally imposed upon it by the clipper support 7', and the relay 11' stops the motor 9' although the contact 10' is still in tilted position. It will be seen, therefore, that the contact 10' reacts only then when the veneer band end B' extending from the clipper 2 to the contact 10' is still in contact with the veneer band B. This is important particularly in cases where, in addition to the automatic cutting into pieces of the veneer band, also faulty portions have to be cut out of the veneer band, in which case the motor 9' of the clipper has to be operated by means of a manually-operated switch 25 which is arranged parallel to the electronic relay 11', i.e. the net line N of the electronic relay 11' to the switch 39 is also led to the hand contact 25 which, in turn, is connected with the drive motor 9' so that when the switch 25 is actuated by hand the motor 9' is placed over the hand contact on the net line N so that the hand contact is thus arranged parallel to the electron relay 11'. In the latter case it is also possible to alternately connect with the electronic relay 11' via a change over switch any number of contacts 10' arranged at different distances from the clipper 2. In this way it is possible to change, in conformity with the condition and quality of the wood, quickly from one cutting length to another without the necessity of stopping the machine.

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What I claim as new and desire to secure by Letters Patent of the United States is:

1. A switch gear for the automatic control of operations in cutting tools, which comprises a conveyor made of insulating material for moving moist material to be cut to and past said cutting tool, means for driving said conveyor at various speeds, means for driving said material at uniform speed to said conveyor, means for imparting reciprocating movement to said cutting tool at right angles to said material, a first control circuit for connecting and disconnecting the drive means for the material a second control circuit for connecting and disconnecting the drive means for the cutting tool, each of said control circuits comprising a triode, sources of current for heating the filaments, the grids, and the plate electrode of said triodes, material-engaging contacts in the path of said conveyor arranged in the grid circuit of said triodes, relays in the plate circuit of each of the triodes and connections between the material and the current sources by way of the machine frame, said relay in said first control circuit becoming operative when the material engages its associated contact said relay in said second control circuit becoming operative when the material simultaneously engages its associated contact and the machine frame, whereby the grid potential is changed, and contact means in the main electric line supplying the means for driving the material conveyor and the cutting tool, respectively, which last mentioned contact means are opened and closed by said relays.

2. A switch gear for the automatic control of operations in a veneer clipper, which comprises a conveyor made of insulating material for moving moist veneer bands to be cut to and past said clipper, means for driving said conveyor at various speeds, a reel for mounting said veneer band as a coil, a motor for driving said coil at uniform speed to said conveyor, said coil being arranged at a distance from the conveyor, whereby veneer band uncoiled therefrom forms a slack therebetween, means for imparting reciprocating movement to said clipper at right angles to said band, a first control circuit for connecting and disconnecting the motor for driving the band, a second control circuit for connecting and disconnecting the drive means for the clipper, each of said control circuits comprising a triode, sources of current for heating the filaments, the grids, and the plate electrode of said triodes, veneer-band-engaging contacts in the path of said conveyor arranged in the grid circuit of said triodes, relays in the plate circuit of each of the triodes and connections between the veneer band and the current sources by way of the machine frame, said relay in said first control circuit becoming operative when the veneer band engages its associated contact, said relay in said second control circuit becoming operative when the veneer band simultaneously engages its associated contact and the machine frame, whereby the grid potential is changed, and contact means in the main electric line supplying the means for driving the conveyor and the clipper, respectively, which last mentioned contact means are opened and closed by said relays.

3. A switch gear according to claim 2, wherein the veneer band-engaging contact is arranged below said slack of the veneer band in such a manner that no contact will be made between said contact feelers and the veneer band, when the latter is uncoiled at the same speed as the conveyor feeds it to the clipper, whereas contact between the contact feelers and the veneer band is made, and the reel-driving motor connected thereby, when the conveyor is driven at lower speed or comes to a stand-still.

4. A switch gear for automatic control according to claim 2, in which said conveyor is made of insulating material in the form of an endless rubber band arranged after the clipper in said machine, means for driving said conveyor, said contacts arranged in the path of the conveyor at a desired distance from said clipper, said contacts

being tiltable and so arranged as to be tilted by the traveling veneer into a position that will not obstruct the further travel of the same, said contacts being connected to said electronic relay, said relay actuating said contact means in the main electric line for operating the motor when the veneer contacts the contacts, and for shutting off the motor when the material disengages from the contacts.

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