Oct. 24, 1939. D. G. BIRMINGHAM 2,177,051

THICKNESS INDICATOR

Filed July 20, 1938 3 Sheets-Sheet 1

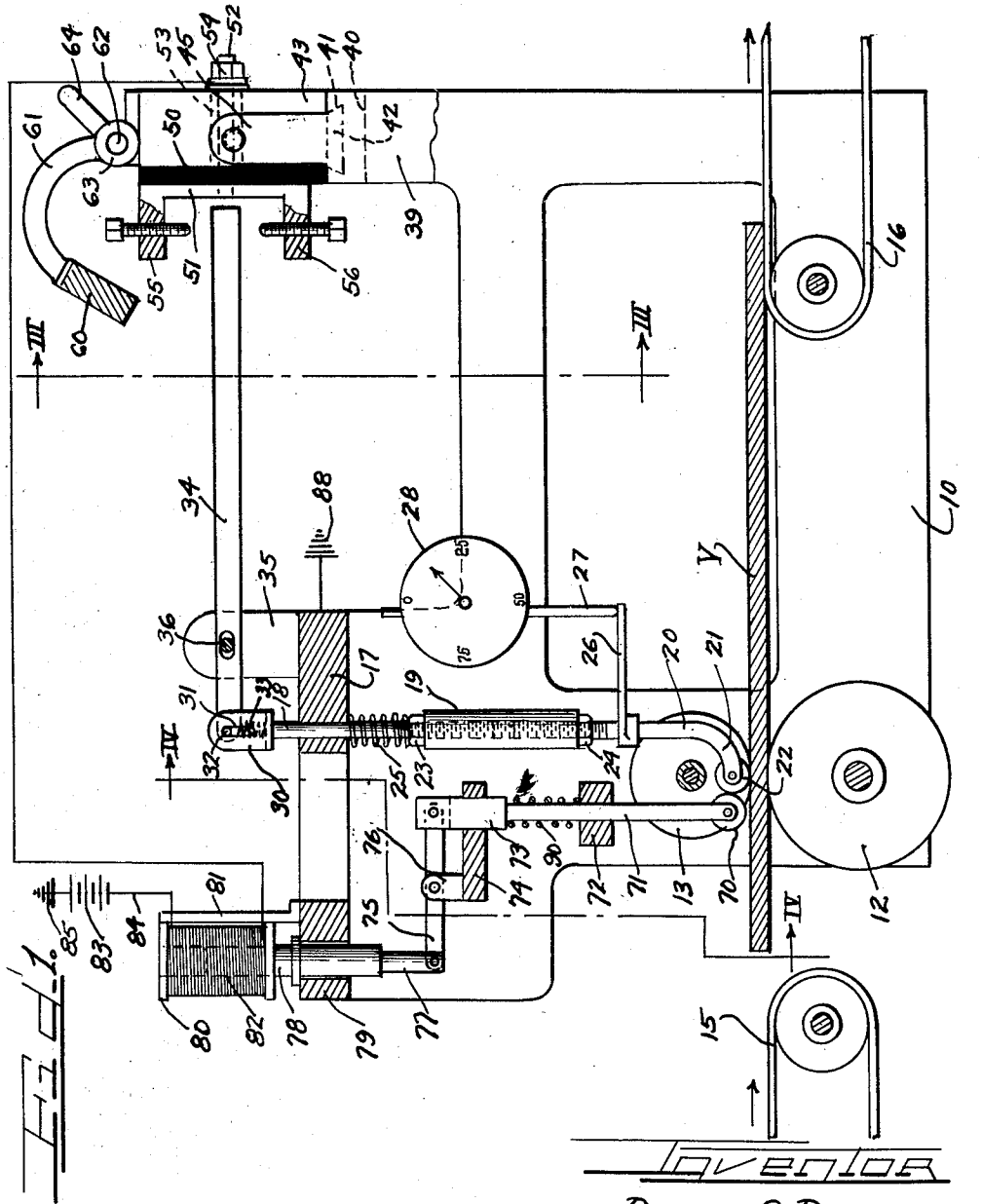

Fig. 1.

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Fig. 2.

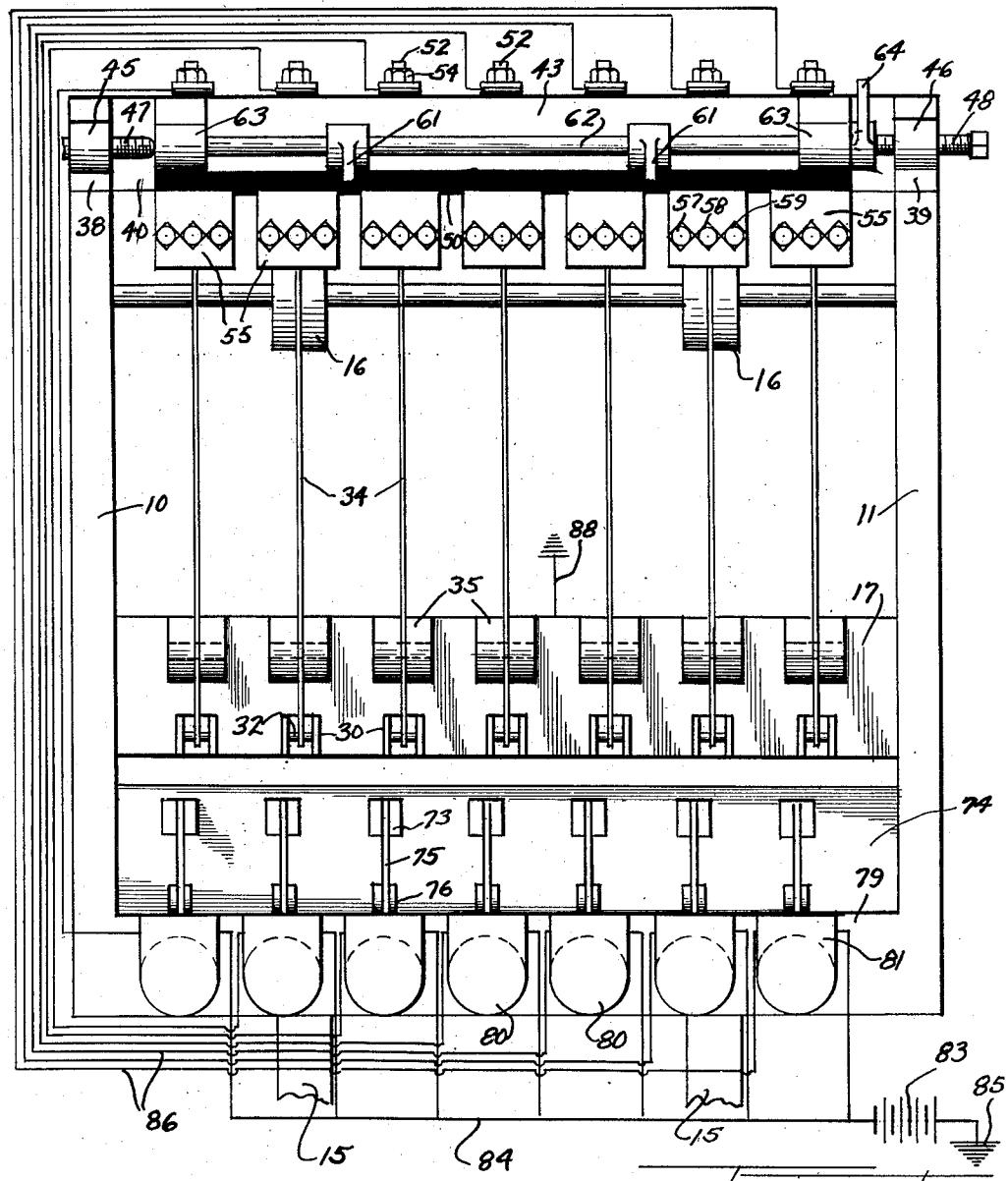

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Fig. 3.

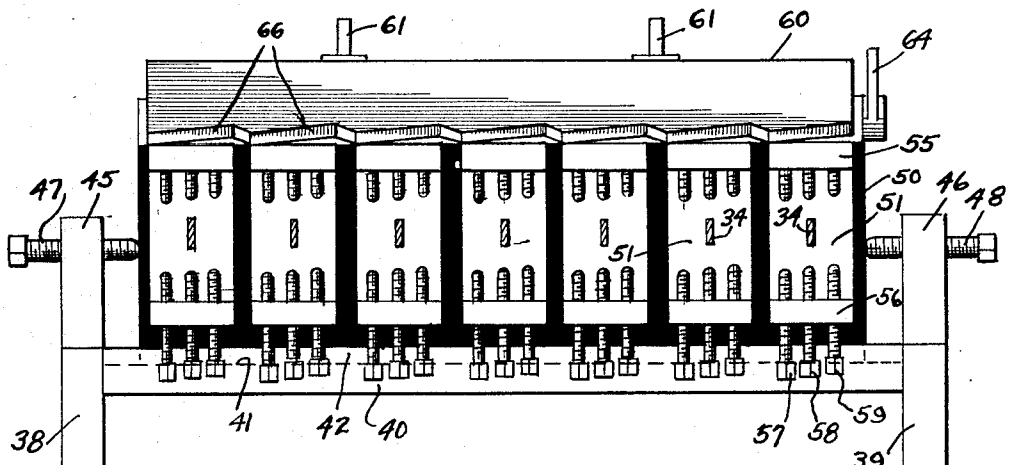
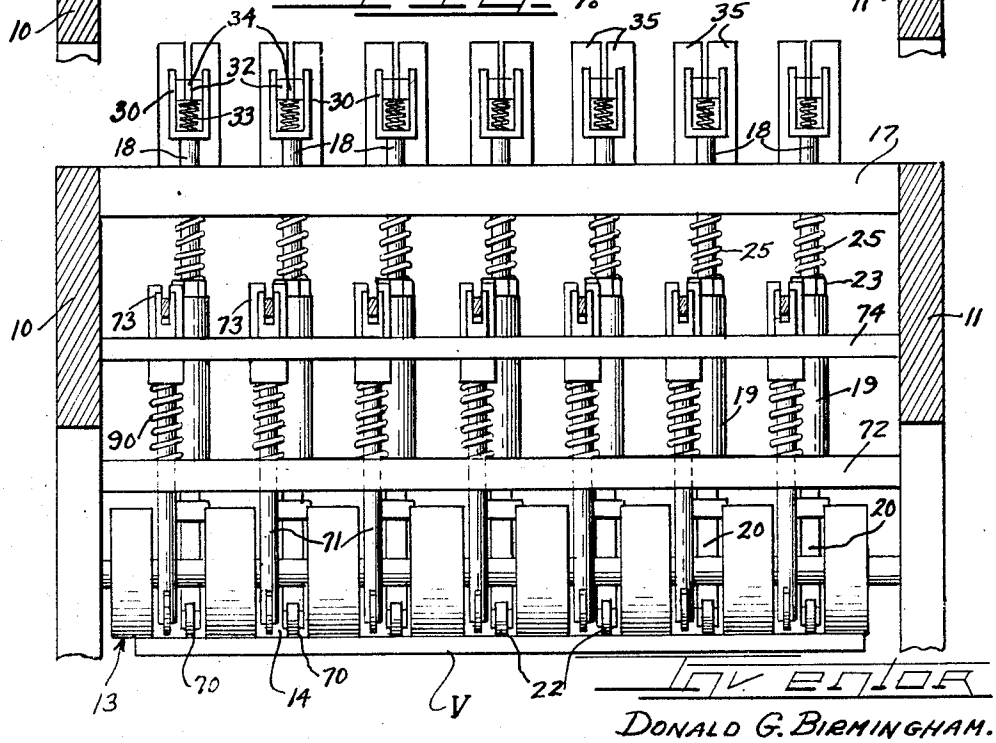


Fig. 4.



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Patented Oct. 24, 1939

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UNITED STATES PATENT OFFICE

2,177,051

THICKNESS INDICATOR

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9 Claims. (Cl. 33—147)

This invention relates to apparatus for visually indicating the thickness of sheet material, and more particularly relates to a machine for marking the low and high spots of wooden veneer sheets.

The machine of this invention will hereinafter be specifically described in connection with the marking of veneer sheets for plywood panel manufacture. It should be understood, however, that the machines of this invention are applicable for use in indicating the thickness of all types of sheet or board material such as lumber, wall board, paper, and the like.

In the manufacture of plywood, veneer sheets are usually peeled from a log by means of a lathe. The lathe is set to cut a veneer sheet of a desired thickness. However, due to variations in wood texture and inaccuracies in lathe operation, these veneer sheets are not always of uniform thickness. It has heretofore been the practice to inspect the veneer sheets manually and to rely upon the skill of the inspector to grade or classify the sheets.

Now, in the manufacture of hot pressed resin bonded plywood for outdoor use it is highly desirable that the veneer sheets making up the plywood panel be of rigorously uniform thickness so as to produce a panel having all of the constituent plies bonded together thruout the entire contiguous surfaces thereof. Since the bonding together of the plies occurs during a heat and pressure operation in hot platen presses, it can be appreciated that variations in thickness of the veneer sheets constituting the panel will result in uneven pressures along the glue lines. Thin spots in the veneers may be sufficient to prevent application of pressure for appreciable areas along the glue lines thereby preventing a good "stick" or bond between the plies at this area.

The device of this invention now provides for the automatic marking of high and low spots on veneer sheets so that an unskilled operator can classify and grade the sheets.

It is, then, an object of this invention to provide a device for automatically gauging and marking the thickness of sheet material.

A further object of this invention is to provide a machine for marking the high and low spots of sheet material.

A further object of this invention is to provide an indicating apparatus that automatically marks the high and low spots of sheet material only when said spots exceed a predetermined tolerance.

A further object of this invention is to provide an automatic marking device for veneer sheets to indicate their high and low spots.

It is a further object of the invention to provide a device for marking variations in thickness of a sheet or board beyond a predetermined tolerance and to include an adjustment on said device for readily changing the tolerances.

A further object of the invention is to provide a veneer thickness indicator capable of being readily set for operation on veneer sheets of different standard thicknesses.

Other and further objects of the invention will become apparent to those skilled in the art from the following detailed description of the annexed sheets of drawings which disclose a preferred embodiment of the invention.

On the drawings:

Figure 1 is a vertical cross-sectional view taken longitudinally through a machine according to this invention.

Figure 2 is a top plan view of the machine shown in Figure 1.

Figure 3 is a vertical cross-sectional view taken along the line III—III of Figure 1.

Figure 4 is a cross-sectional view taken along the line IV—IV of Figure 1.

As shown on the drawings:

In Figures 1 and 2 the reference numerals 10 and 11 indicate main side frame plates for the machine. A roller 12 is rotatably mounted between the plates 10 and 11. A second roller 13 rides on top of the roller 12. The roller 13, as best shown in Figure 4, has a plurality of radial grooves or slots 14 at spaced intervals thereacross. Alternatively the roller 13 may be built up from a plurality of wheels mounted in spaced relation on an axle above the roller 12.

The rollers 12 and 13 are mounted between plates 10 and 11 for receiving therebetween veneer sheets such as V fed thereto by means of belt conveyors 15 and removed therefrom by means of belt conveyors such as 16. Thus the veneer sheets are passed between the rollers 12 and 13 of this machine.

A cross bar 17 is provided between the frame members 10 and 11 and supports a plurality of rods 18 extending therethrough in slidable relation thereto. The bottom ends of the rods 18 are threaded into sleeves 19. These sleeves 19 receive, through the bottom ends thereof, the top portions of rods 20 having curved ends 21 extending into the spaces or slots 14 of the roll 13. Wheels 22 are rotatably mounted on the ends of the curved portions 21 of the rods 20. Locking nuts 23 and 24 are threaded around each of the rods 18 and 20 respectively for abutting the ends of the sleeve 19 to lock the rods in the sleeve in

adjusted position therein. This rod and sleeve arrangement makes possible an adjustment in the effective lengths of the devices.

A helical spring 25 is disposed around each rod 18 between the bar 17 and the nut 23 to urge the roller 22 on the end of the rod 20 against the top surface of the veneer panel V as best shown in Figure 1. The wheel 22 is thereby adapted to ride on the top surface of the veneer V and is held against this veneer by spring pressure.

If desired, an arm 26 can be secured on the rod 20 for abutting the operating rod 27 of a gauge 28 such as an "Ames" indicator gauge. Gauges 28 can be provided for each rod 20 if desired. These gauges only indicate visually the rise and fall of the wheels 22 as the same ride along the veneer sheets.

The top ends of the rods 18 above the bar 17 have yokes 30 formed thereon as best shown in Figures 1 and 4. The side walls of the yokes are slotted vertically as shown at 31 in Figure 1 for receiving the ends of pins such as 32 in slidable relation therein. Small springs 33 urge the pins 32 to the tops of the slots 31. The springs 33 are maintained under compression between the pins 32 and the bottoms of the yokes 30.

The ends of arms 34 extend into the yokes 30 and receive the pins 32 therethrough. The arms 34 are pivotally carried, between cooperating pairs of ears 35 formed on the bar 17, on pivots 36 extending between the ears 35.

The arms 34 are normally held in horizontal position by the yokes 30 but are moved from this position with the rise and fall of the wheels 22. Each wheel 22 in a slot or groove 14 of the roll 13 is thus operatively connected with an individual arm 34.

The frame members 10 and 11 have vertical arm portions 38 and 39 at the ends thereof as shown in Figures 1, 2 and 3. A cross bar or frame support 40 extends between the arms 38 and 39 and is integrally secured thereto. The bar 40 has a dovetailed groove 41 formed longitudinally along the top face thereof. The dovetailed bottom 42 of a block 43 is slidable in the groove 41 of the bar 40. The block member 43 is thus movable on the bar 40 between the arms 38 and 39. To effect adjustment, the top portions of the arms 38 and 39 are provided with extensions 45 and 46 receiving adjusting bolts 47 and 48 respectively therethrough. These bolts abut the ends of the block member 43 and can be moved to slide the member between the arms 38 and 39 on the bar 40.

The block member 43 has an insulating board or block 50 disposed across the front face thereof. A plurality of channel members 51 are mounted in front of the insulation 50, each in alignment with an arm 34. The channel members 51 are held onto the block 43 by means of bolts such as 52 passing through the block but insulated therefrom by means of insulation 53 (Figure 1). Nuts 54 are threaded on the bolts 52 to draw the channel members 51 tightly in place.

The channel members 51 have horizontal flanges 55 and 56 extending above and below the arms 34 as shown. Each flange 55 and 56 has threaded therethrough a plurality of contact points 57, 58 and 59. These contact points 57 to 59 project into the space between the flanges 55 and 56 for variable distances and when the block 43 is moved to position an arm 34 in vertical alignment with a pin or contact point the same are adapted to contact the end of the arm as the arms are moved from a horizontal position.

Since the arms 34 might be moved into the spaces between the contact points when the block 43 is moved, and become bent by continued movement thereof, it is desirable to hold these arms from entering the spaces between the contact points during a movement of the block 43. Because this movement of the block is effected usually when no veneer sheets are being fed through the machine, the arms 34 are then in a raised position because the wheels 22 are free to drop against the roll 12. Therefore to prevent bending of the arms or breaking of the contact points it is only necessary to hold the arms out of the spaces between the top contact points.

For this purpose a bar 60 is carried on a pair of arcuate arms 61 which are secured to a shaft 62 rotatably mounted on top of the block 43 in bosses 63 formed on top of the block. A handle 64 is adapted to effect a swinging of the bar member 60 about the shaft 62 to raise or lower the same into and out of contact with the arms 34.

The bottom edge of the bar 60 has cuts 66 therein sloping upwardly in proportion to the amount that the contact points extend through the flanges 55. Thus, those portions of the edge of the bar 60 adjacent the long contact points are substantially flush with the bottom edge of the bar. However the cuts 66 slope upward from this bottom edge so that the contacting edges thereof adjacent the short contact points are spaced back of the botom edge of the bar. This saw-tooth arrangement of the bottom edge of the bar permits a sliding of the bar over the arms 34 to move the same out of engagement with any of the contact points and to clear adjacent contact points when the supporting block 43 is moved.

As best shown in Figures 1 and 4, a chalk wheel or inking roller 70 is mounted in each slot or groove 14 of the rolls 13 adjacent to the wheels 22. These chalk wheels or inking rollers 70 are carried on the ends of rods 71. The rods 71 extend through a cross bar 72 of the machine frame and have yokes 73 formed on their top ends. The yokes 73 are slidable through another cross bar 74 of the machine frame.

Arms 75 are pivoted intermediate their ends on ears 76 of the bar 74. The ends of the arms 75 are pivoted in the yokes 73 on the rods 71. The other ends of the arms 75 are pivoted to the shanks 77 of solenoid cores 78. The shanks 77 extend through a cross bar 79 of the main frame.

Solenoids 80 are mounted on brackets 81 carried by the bars 79. A separate solenoid 80 is provided for each chalking wheel or inking roller 70.

One end of the winding 82 on each solenoid 80 is connected to a source of power 83 through wires such as 84. The source of power 83 is grounded as at 85.

The other ends of the solenoid windings are connected through wires 86 to the bolts 52 for establishing electrical connection with the channel members 51 and the contact points carried by these channel members. Thus each solenoid 80 having the core thereof operatively connected to a chalk wheel or inking roller is electrically connected to the contact points above and below that particular arm which is operated by the wheel 22 in the same groove or slot of the roll 13.

The machine frame such as the cross bar 17 is grounded as at 88.

Helical springs 90 are disposed around each rod 71 and held under compression between the cross bar 72 of the frame and the yoke 73 of the rod. These springs 90 therefore hold the chalk wheels or inking rollers 70 off of the veneer panels V and also tend to pull the solenoid cores 78 out of the solenoids 80.

Operation of the machine

As veneer sheets V are fed by the conveyor belts 15 between the rolls 12 and 13 the wheels 22 ride on the top surfaces of the veneers and move up and down in accordance with variations in thickness of the sheets. Such movement of the wheels 22 is transferred to the arms 34 to raise and lower the free ends thereof between the contact points. These contact points are adjusted in spaced relation from the normal horizontal position of the free ends of the arms so as to permit a slight movement of the arms without contacting the same. The spaces between the contact points and the normal horizontal position of the arms determines the tolerance permitted for variations in thickness of the veneer. As this tolerance limit is exceeded the arms will contact either the upper or lower contact point, depending on whether or not the wheels 22 are raised or lowered. Such contacting immediately energizes the solenoid controlling the chalking wheel or inking roller 70 in the same groove or slot of the roll 13 in which the wheel 22 is mounted. The energizing of the solenoid will effect a movement of the core 78 into the solenoid to lower the chalking wheel or inking roller against the top surface of the veneer and effects a marking of the veneer for as long as the wheel 22 is in lowered or raised position.

The machine therefore marks, with a line, all thick or thin spots of a veneer sheet and thus makes possible the grading and classification of the sheet.

These thick and thin spots of the veneers can be indicated visibly by means of "Ames" gauges mounted on the machine if desired. However, such gauges are not necessary for operation of the machine.

The spring 33 and slot 31 arrangement of the yoke 30 on the wheel carrying rod 18 prevents breakage of the arms 34 or other parts in the event that the wheels 22 are unduly raised by the passage of a thick object between the rolls 12 and 13.

Since this machine is intended to operate on veneer sheets of different standard thicknesses, various sets of contact points are provided on movable carriers. Thus when operating on veneer sheets of standard thin dimensions one set of contact points is used. When thicker veneer sheets are passed through the machine another set of contact points is used. The various sets of contact point are brought into and out of alignment with the arms 34 by a shifting of the supporting block 43. Each set of contact points is arranged at different levels since obviously the passage of thicker veneer sheets will cause the free ends of the arms 34 to assume somewhat lower positions than are assumed when thinner sheets are passed between the rolls 12 and 13. As a result the contact points for use in connection with the thicker sheets are arranged at lower levels.

From the above description it should be understood that the machine of this invention provides for the accurate marking of thick and thin spots in veneer sheets or in any other sheet material and also provides for a quick adjustment to accommodate sheets of different standard thicknesses.

I am aware that many changes may be made and numerous details of construction may be varied through a wide range without departing from the principles of this invention, and I, therefore, do not purpose limiting the patent granted hereon otherwise than necessitated by the prior art.

I claim as my invention:

1. A gauging and marking device comprising top and bottom rollers adapted to receive a panel or board therebetween, said top roller having a plurality of spaced radial slots therein, vertical rods extending into said slots, wheels carried on the ends of said rods adapted to ride on the panel or board passing between the rolls, lever arms having the ends thereof pivoted to the top end of each rod, contact points for engaging the free ends of said arms, means for moving said contact points relative to said arms, a solenoid energized by contact of the arms with the contact points, marking devices carried by the solenoid cores, and means holding said marking devices in spaced relation from the board or panel when said solenoids are de-energized whereby a rise or fall of the wheels as the same travel over the surface of the panel or board beyond a predetermined amount will move the arms into contact with the contact points for energizing the solenoids to lower the marking devices against the panel or board and indicate the high or low spots thereon.

2. In a marking device including a plurality of pivoted lever arms, a plurality of contact points above and below each pivoted lever arm, and means for shifting said contact points relative to said pivoted lever arms for aligning various points therewith.

3. In a marking device, a plurality of pivoted lever arms, a contact point supporting device adjacent the free end of each pivoted lever arm, a plurality of contact points carried by said supporting device above and below the free ends of the pivoted lever arms and means for shifting all of said contact point supporting members in unison to vary the setting of the device.

4. A marking device for indicating variations in thickness of sheet or board material beyond a given tolerance which comprises riders adapted to travel over a broad face of said sheet or board material, pivoted lever arms operated by said riders, a plurality of pairs of contact points disposed above and below the free ends of the pivoted lever arms, a solenoid for each rider device having the windings thereof energized whenever the pivoted lever arms contact a contact point, said solenoid having cores held out of the windings when the latter are de-energized, a marking device carried by the core of each solenoid, said marking devices being mounted adjacent each rider and means holding said marking devices in spaced relation above the board or panel whereby a rise or fall of said riders sufficient to move the free ends of the pivoted lever arms into contact with the contact points will energize the solenoids to move the marking devices against the sheet material or board and deposit a marking thereon visibly indicating high and low spots.

5. A machine for marking thick and thin areas of sheet material which comprises a rider adapted to contact the sheet material, a marker adja-

cent the rider, means holding the marker in spaced relation from the sheet, a device which when energized moves the marker against the sheet material, a pivoted lever having one end operatively connected to said rider, the other end being free, a plurality of individually different pairs of matched contact points, each pair being shiftable into alignment with the free end of the lever for engaging the lever when it moves from neutral position, and means for electrically connecting each contact point with said device for energizing the marker for moving the latter against the sheet whenever the lever arm contacts a point.

6. A machine for marking thick and thin areas of sheet material which comprises a rider adapted to contact the sheet material, a marker adjacent the rider, means holding the marker in spaced relation from the sheet, a device which when energized moves the marker against the sheet material, a pivoted lever having one end operatively connected to said rider, the other end being free, a plurality of individually different pairs of matched contact points, each pair being selectively engageable with the free end of the lever, means for electrically connecting each contact point with said device for energizing the marker for moving the latter against the sheet whenever the lever arm contacts a point, and means for effecting relative movement between said lever and said pairs of contact points to selectively aline said lever with a particular pair of contact points.

7. In a marking device including a plurality of pivoted levers having free arms, a plurality of contact points on two sides of each free arm of said levers adapted to contact the free arms as the levers pivot from a neutral position between the points, and means for alining various contact points with said free arms of the levers.

8. A thickness indicator which comprises top and bottom rollers adapted to receive a sheet of material therebetween, a plurality of riders disposed at spaced intervals adjacent the top roller for riding on top of the sheet material, a separate pivoted lever arm for each rider, each lever arm having one end thereof operatively connected to a rider and the other end thereof being free, a marking device adjacent each rider, a solenoid associated with each marking device for actuating the device to effect marking, a set of contacts for each arm, each set comprising a plurality of pairs of matched contact points for engaging the free ends of the lever arms as the same are moved from neutral position, means for selectively aligning each pair of contact points in a set and the free end of a lever, and electrical connections between all contact points in each set and the solenoid actuating the marking device adjacent the rider connected with the particular lever.

9. A thickness indicator which comprises top and bottom rollers adapted to receive a sheet of material therebetween, a plurality of riders disposed at spaced intervals adjacent the top roller for riding on top of the sheet material, a separate pivoted lever arm having one end thereof operatively connected to each rider and the other end thereof being free, a marking device adjacent each rider, a solenoid associated with each marking device for actuating the device to effect marking, a set of contact points for each lever arm, each set comprising a plurality of pairs of matched contact points adapted to contact with the free end of the corresponding lever arm whenever this free end is moved from neutral position by the rider, said pairs of contact points being spaced from each other so that one pair only is capable of contacting said lever arm at any one time, electrical connections between all contact points in each set and the solenoid operating the marking device adjacent the rider connected with the particular lever arm, and means for effecting relative movement between said lever arms and the corresponding sets of contact points to align the lever arms and selected pairs of contact points.

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