

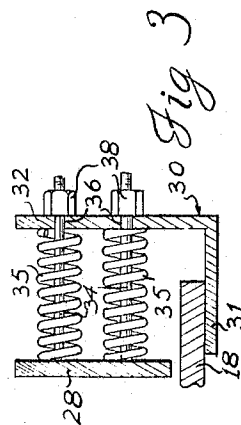
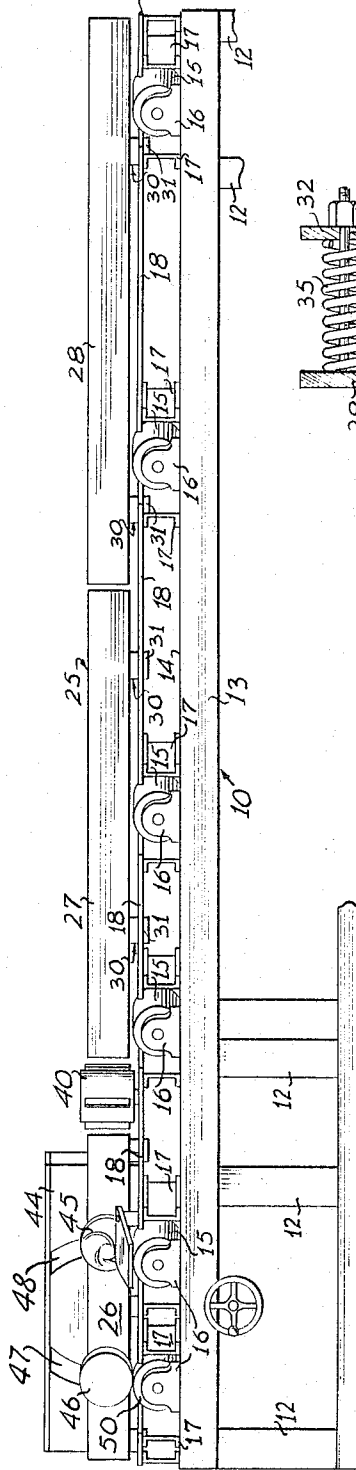
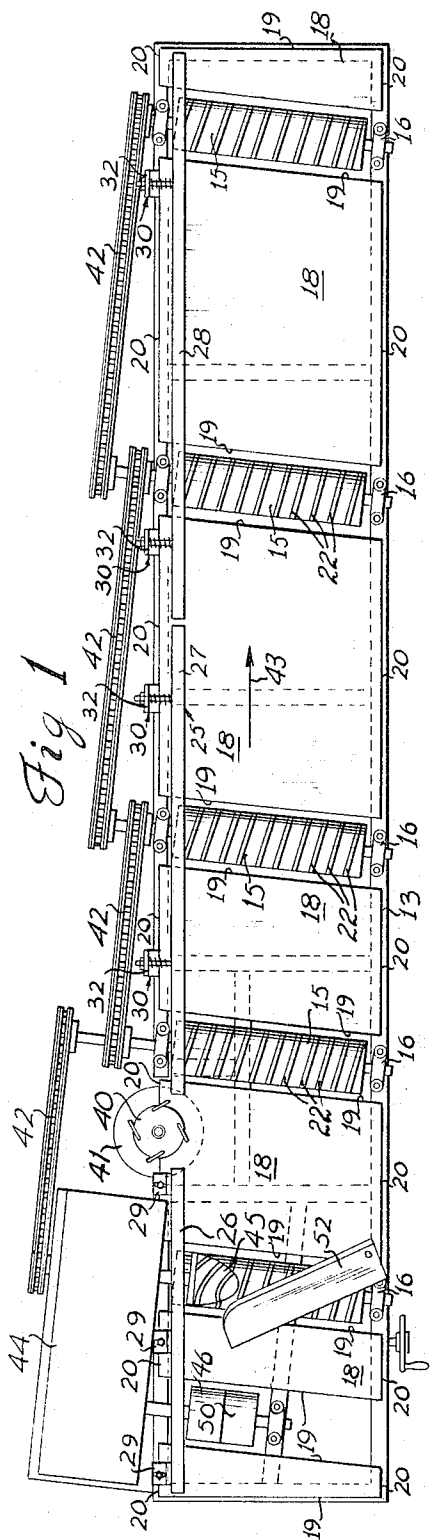
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SINGLE CUTTER BOARD STRAIGHTENER AND METHOD OF STRAIGHTENING

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3,299,921 SINGLE CUTTER BOARD STRAIGHTENER AND METHOD OF STRAIGHTENING

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This application is a continuation-in-part of my copending application, Serial No. 279,150, now Patent No. 3,211,197, filed May 9, 1963, which was itself a continuation-in-part of my earlier application, Serial No. 140,179, filed September 20, 1961, now abandoned.

This invention relates to planning machines of a type utilized in dressing lumber, and is more particularly concerned with a method and apparatus for straightening the concave edge of a board.

When lumber is first sawed out it is usually set out to dry before it is used for construction purposes. During the drying process, the loss of moisture from the lumber frequently causes it to become warped and bowed so that it is no longer suitable to be sold as a high quality product. Thus, the bowed boards must be down graded and sold at a lower price than the straight boards, or they must be recut to remove the bow from the board.

In the past it has been found most desirable to recut the bowed boards to straighten them and sell them as a high quality product; however, the apparatus used to recut the boards frequently cuts too much material away from the boards so that an excessive amount of material is lost in the process that might have been retained with the board if properly cut. Of course, the portion of the board lost due to improper cutting thereof is wasted and the remaining portion of the board, being smaller, brings a lower price.

While successful methods and apparatus have been developed in straightening the edge of bowed boards, as disclosed in my copending application Serial No. 279,150 now Patent No. 3,211,197, a demand is present for a single cutter edge straightener since the use of a single cutter requires the use of a relatively short length guide surface in comparison with multiple cutter edge straighteners. Accordingly, this invention involves a method and apparatus for straightening the concave edge of a bowed board by progressing the board along a predetermined path, pressing the leading portion of the concave edge of the board against a flat stationary cutting plane as the board progresses along its path, moving any portions of the concave edge of the board that project outwardly of the leading portion of the concave edge beyond the cutting plane as the board progresses along its path, and cutting away only any of the portions of the board that project outwardly of the leading portion as the board progresses along its path.

Thus, it is an object of this invention to provide a method and apparatus for feeding the concave edge of bowed boards past a single cutter so that the concave edge is planned in a rigid and straight line without any deflection or turning of the board, irrespective of the amount of bow in the board.

It is another object of this invention to provide a concave edge straightening apparatus for lumber having a single cutter that will not effect boards having a straight edge.

Another object of this invention is to provide a meth-

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od and apparatus for treating the concave edge of a board whereby the leading portion of the concave edge is pressed against a stationary guide, the trailing portion of the concave edge is projected beyond said guide, and a single cutter removes the portion of the concave edge extending beyond said stationary guide.

Another object of this invention is to provide an apparatus for straightening the edge of a board, in which apparatus is simple and efficient in operation, durable in structure, and economically manufactured.

Other objects, features and advantages of the present invention will become apparent from consideration of the following specification when taken in conjunction with the accompanying drawings, in which:

FIG. 1 is a top plan view of the single cutter edge straightener constructed in accordance with the present invention.

FIG. 2 is a side elevational view of the single cutter edge straightener.

FIG. 3 is a view of a detail showing the mounting for the movable wall section.

Referring now more particularly to the drawing, in which like numerals indicate like parts through the several views, the single cutter board straightener includes a table 10 supported in the usual manner from the floor by the various supporting legs 12. The table 10 includes a rectangular frame 13 that provides a support surface 14 for the various components of the single cutter edge straightener. The support surface 14 supports a plurality of driven rollers 15 journaled on each end in the bearings 16. The rollers 15 are spaced apart at angles along the length of the table 10 and a plurality of plates 18 are disposed therebetween. The plates 18 are supported from the support frame 14 by the supports 17 so that the top of the rollers 15 project only a slight distance above the upper surface of the plates 18. The plates 18, except for the end plates, are constructed in the shape of parallelograms so that their edges 19 are parallel to the rollers 15 while their edges 20 are parallel to the frame 13. This arrangement leaves a very small opening between the plates 18 and the rollers 15 so that any rigid objects traveling across the table 10 will not easily fall between the plates and the rollers. The end plates 18 are constructed similar to the other plates, except that they have one of their sides 19 conforming to the shape of the frame 13 of the table 10.

The rollers 15 are constructed of a plastic material, such as rubber or the like, and have a helical groove 22 cut therearound.

The table 10 has a guide wall 25 mounted perpendicularly thereof and extending along one side of its entire length. The wall 25 comprises a stationary section or portion 26 and movable section or portions 27 and 28. The stationary portion 26 of the wall 25 is connected to the several plates 18 in a conventional manner, as by the adjustable bolts 29. The movable portions 27 and 28 of the guide wall 26 are mounted on the angle irons 30. The angle irons 30 have a horizontal portion 31 attached to the under side of the plates 18 and a vertically extending portion 32 extending upwardly of the plates 18, as best seen in FIG. 3. The movable portions 27 and 28 of the guide wall 26 have at each end thereof a pair of rods 34 extending perpendicularly therefrom, said rods of each pair being disposed one above the other. A coil spring 35 surrounds each rod 34, adjacent the respective movable por-

tions 27 and 28 and the rods 34 are inserted through apertures 36 of the vertically extending portion 32 of the angle iron 30. Nuts 38 are threaded onto the ends of the rods 34. With this arrangement it can be seen that the springs 35 surrounding each of the rods 34 biases the respective movable portions 27 and 28 of the guide wall 26 away from the vertically extending portions 32 of the angle irons 30 and disposes the respective guide walls in parallel disposition with respect to the vertically extending portions 32 of the angle irons 30. Since the rods 34 are free to slide through the apertures 36, any pressure exerted on the movable portions 27 and 28 of the guide wall 25 causes the springs 34 to be compressed so that the movable portions 27 and 28 of the guide wall 25 can be pressed back toward the angle irons 30.

The movable portion 27 and the stationary portion 26 of the guide wall 25 are spaced apart and a cutter 40 is positioned therebetween. The cutter 40 is mounted so that its axis of rotation extends in a vertical plane, and it is driven by the motor 41. The cutter 40 is positioned so that its periphery is tangential to the outer surface of the stationary portion 26 of the guide wall 25, and the outer surfaces of the movable portions 27 and 28 of the guide wall 25 when their springs 35 are in their fully expanded position. Thus, the stationary portion 26 of the guide wall 25, the cutter 40, and the movable portions 27 and 28 of the guide wall 25, when their springs 35 are in their expanded position, form a cutting plane, as will be explained more fully hereafter.

The rollers 15 are driven by a series of chain drives 42 from a motor and gear box 44 so that a flat object placed on the rollers and the plates 18 will move in the direction indicated by the arrow 43. The motor and gear box 44 also drives a pineapple 45 and an out-feed roller 46. The pineapple 45 is of the type commonly known in the art, and comprises a substantially conically shaped helically grooved roller, the rotation of which tends to move a board traveling across the plates 18 and rollers 15 toward the stationary portion 26 of the guide wall 25. The out-feed roller 46 is driven at approximately the same r.p.m. as the pineapple 45, and both the pineapple 45 and out-feed roller 46 are spring biased in a downward direction in the motor and gear box 44 so that an object passing beneath them will cause them to pivot upwardly through the grooves 47 and 48 in the motor and gear box 44. This pivotal movement allows the pineapple 45 and out-feed roller 46 to receive objects varying in size traveling over the surfaces of the plates 18 and rollers 22. The out-feed roller 46 has a complementary follower roller 50 positioned therebelow, which is freely rotatable.

An arm 52 is pivotally mounted on the table 10 by attachment to a plate 18 in the vicinity of the pineapple 45, and is spring urged to rotate in a clockwise direction, as viewed in FIG. 1. The arm 52 causes any object traveling across the board straightener in the direction of the arrow 43 to travel against the stationary portion 26 of the guide wall 25.

Operation

In the operation of the single cutter board straightener, a bowed board is placed on the working surface of the apparatus and with its concave edge facing the guide wall 25 and is caused to move in the direction of the arrow by the rollers 15. The rollers 15 are angled across the length of the board straightener so that the boards will migrate toward the movable portions 27 and 28, and the stationary portion 26 of the guide wall 25. When the boards come into contact with the movable portions 27 and 28 of the guide wall 25 before reaching the vicinity of the cutter 40 the movable portions will remain in their extended positions under the bias of their springs 35 since the angle of the rollers 15, and the frictional force between the rollers 15 and the board are not enough to compress the springs 35.

Since the movable portions 27 and 28 of the guide wall 25 remain in the cutting plane defined by the guide wall 25 and the cutter 40, when the leading portion of the board reaches the vicinity of the cutter 40 it will be held away from the cutter so that it will bridge the space between the movable portion 27 and the stationary portion 26 of the guide wall 25 without any appreciable action by the cutter 40 thereon. As the board travels further through the apparatus, across the stationary portion 26 of the guide wall 25, the pineapple 45 presses the leading portion of the board against the stationary portion 26 of the guide wall 25 so that the leading portion of the board is pressed flat against the stationary portion 26 of the guide wall, regardless of the shape of the remaining portion of the board. If the board is curved, and if the concave portion of the board is facing the guide wall 25, the force exerted on the board by the pineapple 45 will cause the trailing portion of the board to be pressed against the movable portions 27 and 28, so that their springs 35 are compressed only to that degree necessary for the movable portions to accommodate the projecting curved portion of the concave board. The angle at which the rollers 15 are disposed in the apparatus further insures that the boards are pressed into the movable portions of the guide wall 25 and the helical grooves 22 of the rollers 15 further insure that enough frictional force is exerted on the boards to help the pineapple 45 cause the boards to be pressed inwardly with the movable portions 27 and 28 of the guide wall 25.

As the board further progresses through the machine, the portion of the board projecting beyond the cutting plane travels toward and eventually into the cutter 40 and is removed thereby. Since the cutter 40 and the stationary portion 26 of the guide wall 25 are both in the cutting plane, the cutter creates a new surface on the edge of the board that is fed toward the stationary portion 26 of the guide wall 25. When the pineapple 45 presses the new surface of the board against the stationary portion 26 of the guide wall 25 the board continues to travel straightaway down the surface of the stationary portion 26, without any pivotal motion, whereby the cutter 40 creates a straight edge on the board.

The out-feed roller 46 engages the board at the time when the cutter 40 usually begins to cut away the warped portion of the board. Thus, the out-feed roller insures that enough force is exerted on the board to cause it to continue to move through the apparatus while being acted on by the cutter 40.

In the event that the board is placed on the apparatus so that it is not fully in contact with the guide wall 25 by the time it gets to the pineapple 45, the arm 52 engages the board and pushes it toward the pineapple 45 and the stationary portion 26 of the guide wall 25 to insure that the board is properly aligned on the apparatus and that a proper cut is attained.

With this arrangement it can be seen that the movable portions 27 and 28 of the guide wall 25 tend to keep the boards traveling through the apparatus from engaging the cutter 40 until the leading portion of the concave edge of the board has been engaged by the pineapple 45. This prevents the leading portion of the concave edge from being cut away by the cutter 40, which prevents an excessive amount of material from being lost in the process. Furthermore, after the leading portion of the concave edge of the board has engaged the stationary portion 26 of the guide wall 25 so that the remaining portion of the concave edge of the board is aligned with respect to its leading portion, only the portion of the board projecting beyond the cutting plane will be cut from the board. Obviously, this results in a minimum amount of material being cut from the board.

In the event that the leading portion of the concave edge of the board is the most curved part of the board,

it can be seen that the space between the movable portion 27 of the guide wall 25 and the stationary portion 26 would allow the leading edge of the board to come into contact with the cutter 40 so that a portion thereof would be cut away before reaching the stationary portion 26 of the guide wall 25. In this manner, the unusually curved leading portion of a board would be straightened to some extent before it reached the stationary portion 26 of the guide wall 25 and a successful cut would be attained in the concave side of the board.

It will be obvious to those skilled in the art that many variations may be made in the embodiments here chosen for the purpose of illustrating the present invention without departing from the scope thereof as defined by the appended claims.

What is claimed as invention is:

1. An edge straightening device for reducing the bow in the concave side of a bowed board comprising:

a substantially straight guide wall including an elongate movable section followed by a fixed straight section, said fixed section being substantially shorter than the movable section,

cutting means aligned with the guide wall between the movable section and the fixed section the cutting edge of the cutting means being in the same plane as the guide wall,

feed means for moving said board parallel to said guide wall,

means yieldably urging the movable section toward the feed means and in alignment with the guide wall for normally keeping the board beyond said guide wall, and,

means adjacent the fixed section for transversely pressing the leading edge of the board against said fixed section thereby transversely pressing the concave portion of the board towards said guide wall so that any portion of the board extending across the guide wall will depress the movable section in proportion to the amount of crook in the board to engage and be cut off by the cutting means.

2. An edge straightening device for reducing the bow in the concave side of a bowed board comprising:

a substantially straight guide wall defining a guide surface, said guide wall including an elongate movable straight section followed by a fixed straight section, said fixed section being substantially shorter than the movable section and defining a guide surface,

cutting means aligned with the guide wall between the movable section and the fixed section, said cutting means having a cutting edge in the same plane as said guide surface,

feed means for moving said board parallel to said guide wall,

means yieldably urging said movable section of said guide wall toward said feed means and in alignment with said fixed section of said guide wall for normally keeping the board to one side of said guide wall, and

means adjacent said fixed section of said guide wall for transversely pressing the leading edge of the board against said fixed guide surface and transversely pressing the concave portion of the board toward said guide wall so that any portion of the board extending beyond the fixed section guide surface into said movable section of said guide wall will depress said movable section in proportion to the amount of crook in the board to engage and be cut off by said cutting means.

3. A board edge straightening device for cutting off the projecting portions on the concave side of a bowed board comprising:

a substantially straight guide wall including a stationary portion having a stationary guide surface defining a cutting plane and a movable portion having a movable guide surface, said movable portion being disposed parallel to and normally in alignment with said stationary portion with said movable guide surface in said cutting plane,

cutting means positioned between said stationary portion and said movable portion of said guide wall, said cutting means having a cutting edge in said cutting plane,

means for resiliently biasing said movable portion of said guide wall toward and parallel to said cutting plane,

feed means for moving a board parallel to said guide wall from said movable portion past said cutting means and said stationary portion,

means adjacent said stationary portion of said guide wall for pressing the leading edge of a board flat against said stationary portion and for extending any portions of the trailing edge of said board that project outwardly beyond the leading edge against said movable portion beyond said cutting plane, whereby said feed means moves any of said portions of said board that project outwardly beyond the leading edge into said cutting means.

4. An edge straightening apparatus for removing the curved portion in the concave side of a bowed board comprising:

means for progressing a board along a predetermined path,

means for pressing the leading portion of the concave edge of said board against a flat stationary cutting plane as said board progresses along said predetermined path,

means for moving any portions of said edge of said board that project outwardly of said leading portion beyond said cutting plane as said board progresses along said path, and

means for cutting away only any of said portions of said board that project outwardly of said leading portion as said board progresses along said path.

5. A method of cutting away the projecting portions on the concave side of a bowed board comprising:

progressing said board along a predetermined path, pressing the leading portion of the concave edge of said board against a flat stationary cutting plane as it progresses along said path,

moving any portions of the concave edge of said board that project outwardly of said leading portion beyond said cutting plane as said board progresses along said path,

cutting away only any said portions of said board that project outwardly of said leading portion as said board progresses along said path.

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