Nov. 16, 1948. G. N. ALBREE 2,454,114

SCARFING MACHINE

Filed Jan. 18, 1945

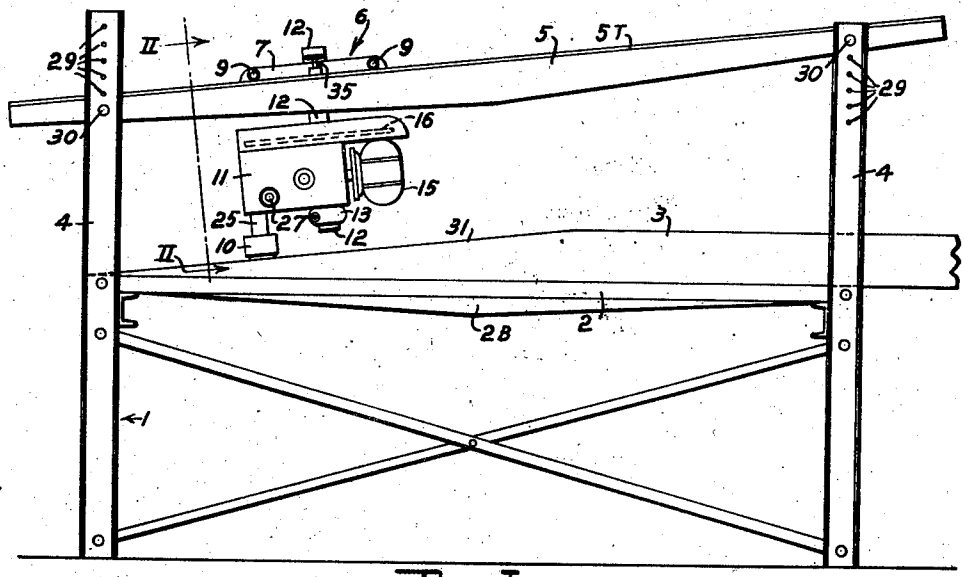
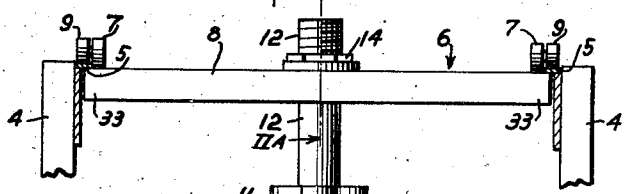


Fig. I.



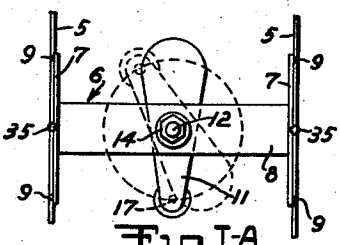


Fig. I-A.

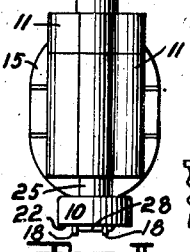


Fig. II.

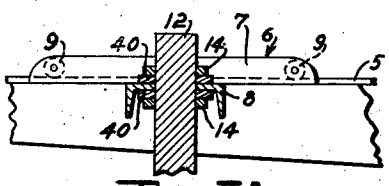


Fig. II-A.

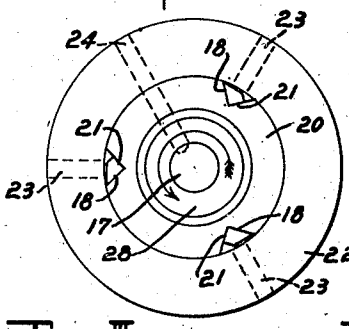


Fig. III.

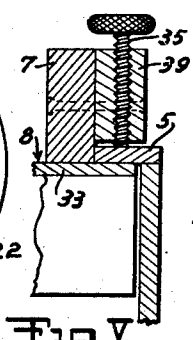


Fig. V.

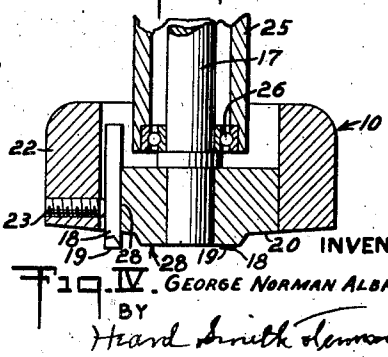


Fig. IV.

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Patented Nov. 16, 1948

2,454,114

UNITED STATES PATENT OFFICE

2,454,114

SCARFING MACHINE

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Application January 18, 1945, Serial No. 573,441

2 Claims. (Cl. 144—118)

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This invention relates to a scarfing machine, and one object of the invention is to provide a novel machine which, while primarily designed to function as a scarfing machine, is nevertheless well adapted to perform a wide variety of other operations such as tenoning, rabbeting, paneling, grinding, grooving, jointing, sanding, shaping, molding, drilling, etc.

A further object of the invention is to provide a novel mechanism which when used as a scarfing machine is well adapted to cut a scarf equally well on either large sticks such as would be used in making spliced masts or spars for a vessel or on small pieces.

A further object is to provide a machine capable of performing any one of the above operations but which is simple in construction and inexpensive to build.

Another object of the invention is to provide a novel machine for performing the above operations in which the work is held stationary on a supporting bed and the cutting tool is mounted on a carriage movable on tracks situated above the bed.

A still further object of the invention is to provide a novel machine of this type in which the tracks can be adjusted either into a position parallel to the bed, in which case the cutting tool can be used for planing, edging and similar operations, or can be adjusted into a wide variety of angular positions, in which case the machine is set up for cutting scarfs, bevels, miters, etc.

Further objects of the invention will be apparent from the following description of one embodiment thereof, and the novel features of the invention will be pointed out in the appended claims.

In the drawings:

Fig. I is a side view of a machine embodying my invention.

Fig. IA is a top plan view of the carriage by which the tool is supported.

Fig. II is a fragmentary sectional view on the line II—II, Fig. I.

Fig. IIA is a section on the line IIA, Fig. II.

Fig. III is a bottom plan view of the cutting tool.

Fig. IV is a fragmentary sectional view through the cutter and the lower end of the quill in which the spindle carrying the cutting tool is mounted.

Fig. V is an enlarged sectional view showing the means for clamping the carriage to the track.

The machine herein shown comprises a suitable frame 1 which is equipped with a stationary, rigid supporting bed 2, 2B which supports the work piece 3 to be operated on by the machine.

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The frame 1 is provided with a pair of end posts 4 at each end thereof, and said posts support a pair of parallel tracks 5, on which operates a carriage 6 from which the cutter head is suspended. The carriage 6 is shown as comprising two side rail members 7 which are connected by a cross member 8, herein shown as having a channel formation. Each side rail 7 is provided with a ball bearing roller 9 at each end, said rollers resting on and traveling over the tracks 5. Each track 5 is a rigid track which is stiffened by giving it an increased vertical dimension at its central portion as plainly seen in Fig. 1. The tracks are preferably relatively widely spaced from each other to provide a steady support for the carriage 6.

The cutter head which is indicated generally at 10, is carried by a machine head 11, which in turn is supported on a shaft or column 12 that is secured to and depends from the cross piece 8 of the carriage. This column 12 extends through an opening with which the machine head 11 is provided and the latter rests on a collar 13 adjustably mounted on the lower end of the column 12. The column 12 is adjustably secured to the cross member 8 so that the said column can be adjusted up and down in the cross member to provide for vertical adjustment of the machine head 11. For this purpose the upper end of the column which extends through an opening in the cross member 8, is screw-threaded and has two clamping nuts 14 screw threaded thereto, one of the nuts being situated above the cross member 8 and the other beneath the latter, suitable washers 40 being used between the nuts and the cross member 8. When the nuts are both tightened, the shaft or column 12 will be rigidly anchored to the carriage, but by adjusting the nuts 14 up or down on the shaft 12, the latter can be moved up or down. The position of the machine head 11 can thus be adjusted vertically either by adjusting the position of the collar 13 on the shaft 12 or by adjusting the shaft itself vertically in the cross member 8 by means of the nuts 14.

The shaft 12 is so mounted that it extends perpendicular to the plane of the tracks 5.

The machine head 11 not only carries the cutter head 10 but it also supports a motor 15 by which the cutter head is operated. The shaft of the motor is connected by suitable driving belt 16 with a pulley on the upper end of the spindle

17 carrying the cutter head 10. The spindle 17 extends parallel to the column 12 but is out of line therewith. Said spindle 17 with its cutter head and the motor 15 are mounted on opposite sides of the machine head 11, said spindle and cutter head being on one side of the column 12 and and the motor 15 being on the other side thereof. These parts, the motor 15 and the spindle 17 with its cutter head 10, are so disposed relative to each other that each substantially balances the weight of the other. The construction is such that the axis of the rotation of the cutter head is parallel to the shaft 12 and thereby perpendicular to the plane of the tracks 5. The cutter head 10 herein shown is provided with a plurality of cutters or bits 18 which project from the lower face thereof and each of which has a cutting edge 19 on its lower end. The particular cutter head herein shown is made with a central hub portion 20 that is mounted on the lower end of the spindle 17 and which is provided in its periphery with a plurality of vertically extending angular recesses 21 in which the cutters or bits 18 are received. Surrounding the hub 20 is a ring member 22 which closes the open side of each recess 21 and which carries set screws 23 adapted to engage the bits or cutters 18, thereby to firmly clamp them in their adjusted position. The hub 20 will preferably have a shrink fit in the ring member 22. 24 indicates a set screw which extends through the ring member 22 and the hub member 20 and impinges against the spindle 17, thereby to firmly secure the cutter head 10 on the spindle.

The machine head 11 is in all material respects similar to the head which is commonly used in motor-driven drill presses, and it is equipped with the usual quill member 25 in which the spindle 17 is rotatably mounted by means of suitable ball bearings as usual, the lower ball bearings being shown at 26 in Fig. IV. The machine head 11 is also provided with the usual means for raising and lowering the quill, said means being operated by the hand wheel 27, and it is also provided with any conventional means (not shown) for locking the quill in any adjusted position, and for locking it to the shaft or column 12.

There are, therefore, provided three different and independent means for adjusting the cutter head 10 vertically relative to the carriage 6, i. e., (1) the adjustable collar 13, (2) the means for adjusting the shaft 12 in the cross member 8, and (3) the means for adjusting the quill 25 in the machine head 11. The adjustable collar 13 affords means for obtaining a rough or coarse adjustment and the nuts 14 and hand wheel 27 each provide means for obtaining a fine adjustment.

The hub 20 of the cutter head 10 is provided with the central extension 28, and in setting up the cutters 18 they will be so disposed that the cutting edge will project slightly below the under face of the extension 28, the distance which these cutters project defining the depth of cut which can be made.

The machine head 11 is mounted on the shaft 12 so that it can swing about the shaft as an axis as indicated in the full and dotted lines in Fig. IA, and can be locked to said shaft by conventional locking means, not shown.

I have stated above that the tracks 5 are so mounted on the posts 4 that they can be set either in a position parallel to the bed 2 or in a variety of angular positions. One convenient

and practical way of providing for this is to make each post 4 with a plurality of apertures 29 to receive bolts 30 by which the tracks can be bolted to the posts. In the adjustment of the tracks shown in Fig. V, the right hand end of the tracks is bolted to the upper holes in the right hand posts 4, while the left hand end of the tracks is bolted to the lower holes of the left hand posts 4, thus giving the tracks the inclination shown. This is one position in which the tracks may be adjusted if the machine is to be used for providing a finished scarf face 31 on a work piece such as indicated at 3.

In forming a scarf on a large stick such as might be used in making spliced masts or spars for vessels, it is customary to first roughly saw the scarf face with a band saw and then to finish the roughly sawed surface so as to provide a perfectly true scarf surface. Such finishing operation has heretofore been done by hand, which is a slow and laborious proceeding even for a highly skilled workman. With my machine the roughly sawed scarf face can be quickly and accurately finished.

The stick 3 with the roughly sawed scarf surface will be placed on the bed 2 as shown in Fig. I and the tracks 5 will be adjusted into an angular position to produce a scarf of the desired angle. The operator will then move the carriage 6 to the right hand or upper end of the tracks 5 and swing the machine head 11 about the shaft 12 to bring the cutter head 10 directly over the work. With the motor 15 operating to rotate the cutter head 10, the operator will then move the carriage 6 along the tracks 5 during which operation the cutter will act on the work piece 3 and thereby cut a scarf surface 31 which is parallel to the plane of the tracks 5.

If the work piece 3 is wider than the swath which is cut by the tool as the carriage travels over the tracks, it will be necessary to make several passes of the cutter head 10 over the work in order to cut a scarf surface clear across the width of said surface. For the first pass the machine head 11 may be adjusted so that the cutter head will make a cut the length of the scarf 31 at one edge of the work piece as the carriage moves from right to left, and at the end of the first pass the carriage may be returned to the upper end of the tracks and after swinging the machine head 11 about the shaft 12 to bring the cutter head 10 into a position to cut a second swath along side of the first swath, the carriage may again be moved toward the left Fig. I to cut the second swath, these operations being repeated until the scarf face 31 has been cut clear across the width of the work piece 3.

Or if desired, the machine may be manipulated so as to make a cut both during the movement of the carriage from the high end of the tracks to the low end and during the return movement to the high end.

Another way in which a scarf on a wide work piece can be cut is to start at either end of the scarf face and swing the machine head back and forth about its shaft 12 and at the same time gradually feed the carriage 6 forward. This operation would cut a plurality of transverse swaths back and forth across the width of the work piece and progressively one end to the other of the scarf face.

If the work piece 3 is a relatively large and heavy stick, the weight of the stick will be sufficient to hold it on the bed 2, it being under-

stood that in case of a long stick suitable supports would be provided for the stick at intervals along its length.

If the work piece 3 is a small or light piece, then it would be desirable to clamp it to the bed 2, which may be done by any suitable clamping means.

It will be noted from Fig. IV that the ring member 22 has a greater vertical dimension than the central hub 20, as a result of which the tool head is formed with a central recess 32. In the construction shown, the spindle 17 is so made that the lower end of the quill 25 with its ball bearing 26 is located within the recess 32. This construction has the advantage that it brings the cutting edges 19 of the bits 18 relatively close to the lower bearing of the spindle. The advantage of this construction is that the tool will operate with increased steadiness and with less tendency for any vibration.

While the tracks 5 are herein shown as inclining downwardly from the right to the left in Fig. I, yet because of the construction shown, said tracks might be adjusted on the posts 4 so as to incline downwardly from left to right.

Hence with this construction it would be possible to cut a scarf face which inclines downwardly from the right to the left as shown at 31 in Fig. I or which inclines in the opposite direction. This is of special advantage in cutting scarfs on two long sticks which are to be spliced together. One of the two sticks could be placed on the bed as shown in Fig. I, said stick being introduced from the right hand end, and the scarf surface 31 cut thereon as above described. The finished stick would then be removed from the bed and the other stick placed thereon by being introduced from the left hand end. The tracks then could be adjusted on the posts so as to incline in the opposite direction from that shown in Fig. I but at the same angle to the bed, and the machine head could then be swung about its post 12 through an angle of 180° as shown in dotted line, Fig. IA and then used for cutting the scarf on the other stick which was introduced from the left hand end.

With this method of operation, the scarfed ends of the two sticks will be situated adjacent each other when the scarfing is finished so that they can be glued and spliced together without the necessity of withdrawing one of the sticks from the machine and turning it end for end as would be necessary if both sticks were introduced into the machine from the same end and the two scarfs cut thereon without changing the position of the tracks.

If the tracks 5 are adjusted so that they have a position parallel to the bed 2, then the cutter head 10 may be used for planing, edging and like operations.

By removing the cutter head 10 and its spindle from the quill 25 and introducing thereinto another spindle adapted to hold some other tool such as a drill chuck or a routing tool collet, etc., and by adjusting the tracks 5 so that they stand parallel to the bed 2, the machine would be used for drilling or routing operations. If a sanding disk is substituted for the cutter head 10, then the device could be used for sanding purposes. In fact it is possible to equip the machine with a wide variety of tools adapted to perform a wide variety of operations such as above enumerated.

For performing some of these operations, it is desirable that the carriage should be held stationary, and I have, therefore, provided means for locking the carriage to the tracks 5. For this purpose the ends 33 of the cross member 8 is shown as extending underneath the tracks 5, and each side rail 7 of the carriage is provided with a projection 39 carrying a clamping screw 35 adapted to act against the top of the corresponding track 5. By tightening the clamping screws 35, the ends 33 of the cross piece 8 will be clamped firmly against the underside of the tracks thereby firmly anchoring the carriage in stationary position.

Another way in which the machine can be used would be to equip the bed 2 with a fence or guide and then to feed the work across the bed while the carriage 6 is clamped to the tracks 5. During such an operation the tracks could be placed in either a horizontal position or in an inclined position depending on the character of the work being performed.

Because of the construction of the frame with its open sides and open ends, the work may be introduced into the machine from either end or from either side and the feeding movement of the work may be either lengthwise or crosswise of the bed 2.

Furthermore the open sides of the frame make it possible to introduce into the machine from either side a wide work piece of any length, the width of which is limited only by the distance between the posts 4 at the two ends of the frame.

As illustrative of the versatility of the machine, reference may be made to its use in drilling holes in wide sheet material. Such sheet material can be introduced into the machine from either side, and with the tracks 5 arranged horizontally and a drill mounted in the machine head in place of the cutter head 10, it would be possible to drill holes in any desired location on the sheet because of the fact that the carriage 6 can be moved into any position along the track 5, and the machine head 11 can be swung laterally about the column or shaft 12. It will be understood, of course, that when the machine is used in this way the carriage 6 will be clamped to the track and the machine head 11 locked to the column 12 during the drilling operation.

Other uses to which the machine may be put will readily suggest themselves to any skillful mechanic using the machine.

I claim:

1. A machine of the class described comprising a supporting frame, a stationary rigidly supported work-supporting bed mounted on said frame and extending from one end to the other thereof, a pair of rigid parallel tracks having a relatively widely spaced relation, means rigidly supporting said tracks directly above the bed, a carriage movable on said tracks, a column rigid with and depending from the carriage and having its axis at right angles to the plane of the tracks, a machine head mounted on said column for bodily turning movement thereabout, a tool-carrying shaft depending from the machine head and situated parallel to but out of line with the column, a cutting tool mounted on the lower end of said shaft, a tool operating motor mounted on said machine head and situated on the opposite side thereof from the tool-carrying shaft, and means connecting said motor to said shaft.

2. A machine of the class described comprising a stationary work-supporting bed, supporting posts rising from each end of the bed, a rigid track structure supported at its ends on said posts for vertical adjustment and located above

the bed, said track structure comprising a pair of rigid parallel tracks, a carriage mounted on said tracks, said carriage presenting two side members each having two rolls resting on one of the tracks and also presenting a cross member rigidly connecting said side members, a column rigidly carried by and depending from the cross member and having its axis at right angles to the plane of the tracks, means for adjusting said column vertically relative to the cross member, a machine head mounted on said column for turning movement about the axis thereof, a tool-carrying shaft depending from the machine head and having its axis parallel to the column but non-axially alined therewith, means to rotate the shaft, and a cutting tool carried by the lower end of said shaft.

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