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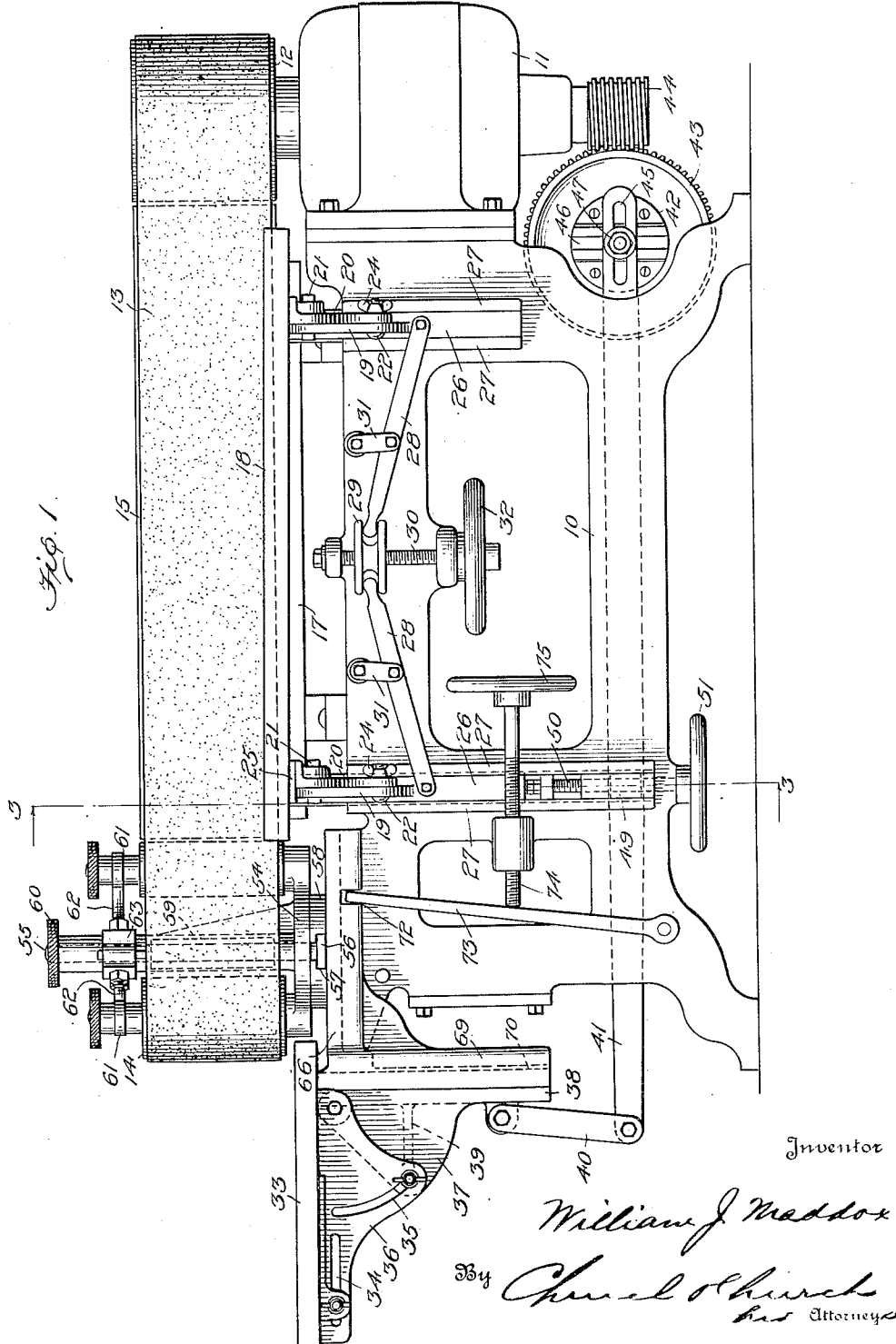
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W. J. MADDOX

EDGE AND SPINDLE SANDER

Filed July 21, 1925

3 Sheets-Sheet 1



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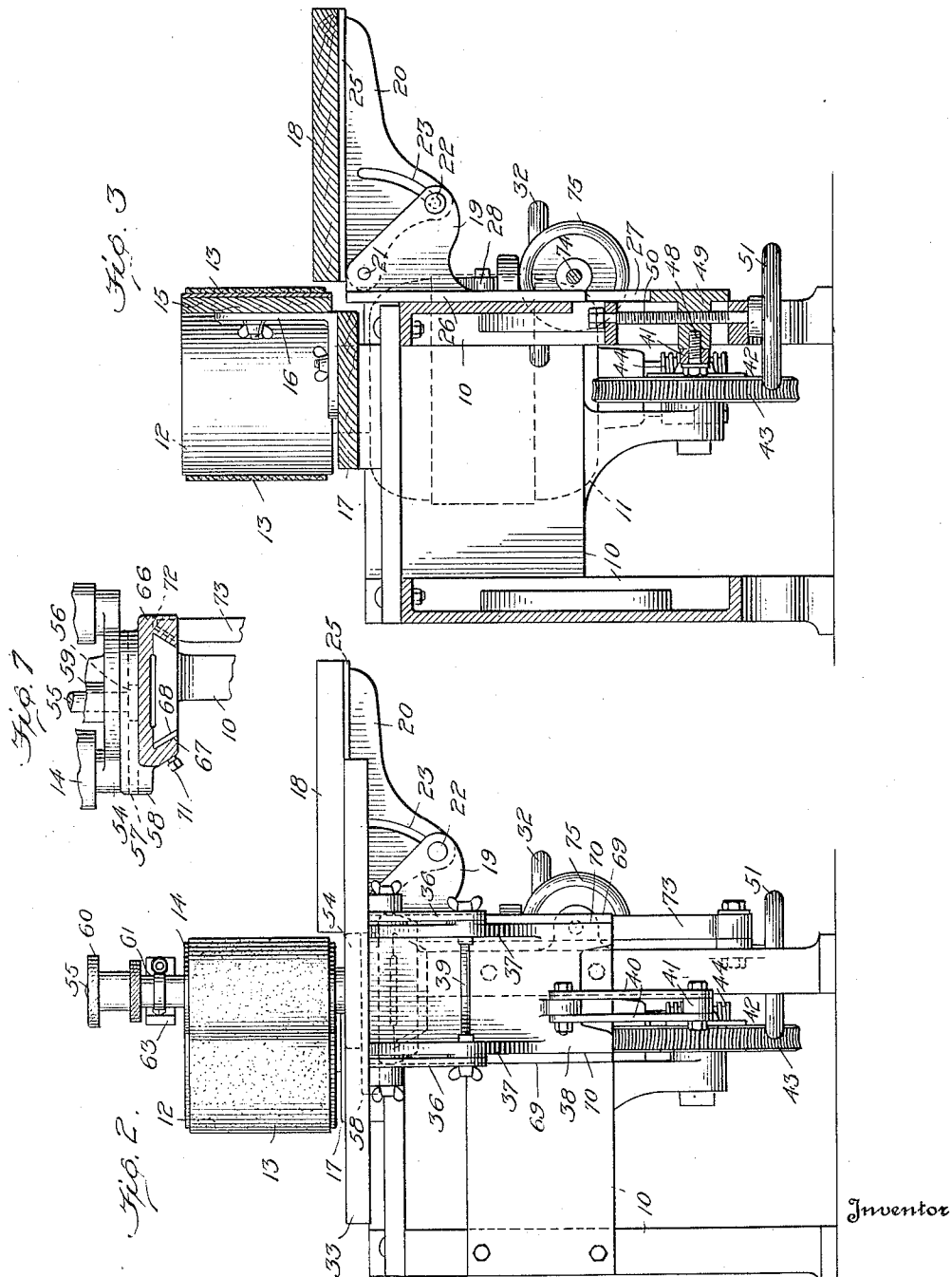
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3 Sheets-Sheet 2



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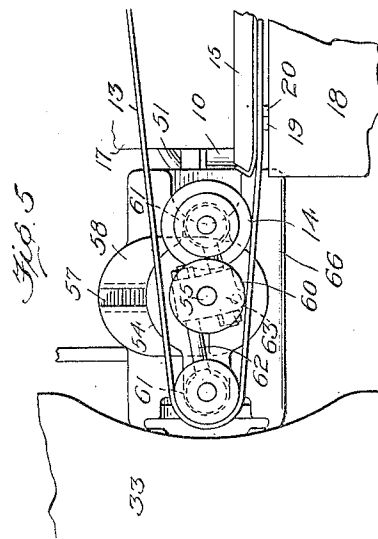
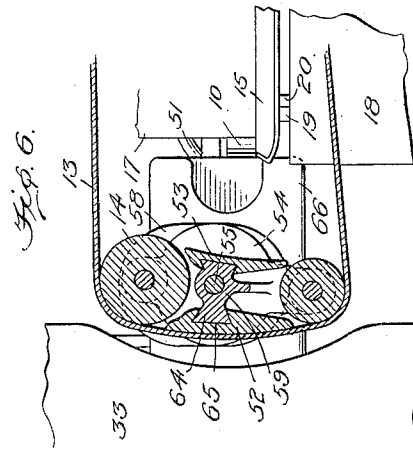
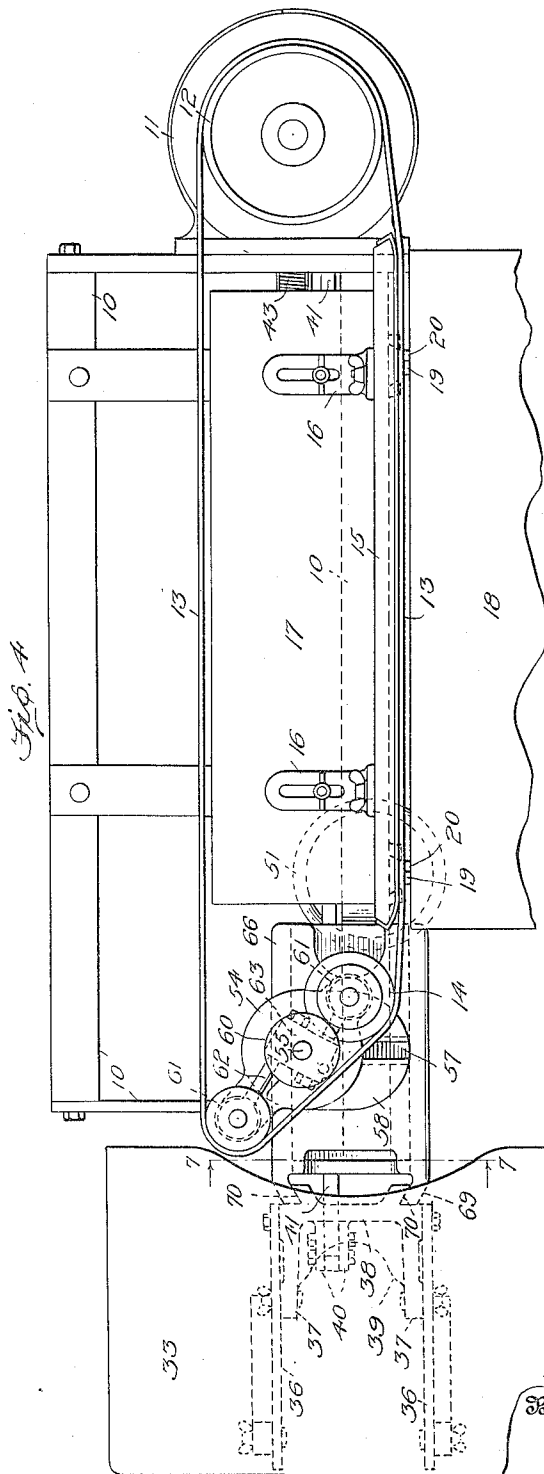
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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE.

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EDGE AND SPINDLE SANDER.

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This invention relates to improvements in wood-working machinery or the like and particularly to the type of machine known in the trade as an edge and spindle sander, it being especially adapted for finishing off the edges of various articles.

In machines of this character there is usually a work supporting table, called the side table, and an endless traveling belt of an abrasive material, such as sand paper, located adjacent said table and against which the edge of the article worked upon is forced for sanding or dressing it off. The width of this belt of sand paper is in most instances several times the thickness of the articles being finished so it will be apparent that some means must be provided for causing the edge of said article to be brought into contact with different portions of the belt transversely of the latter or, otherwise, said belt would become worn in a relatively narrow zone extending lengthwise of the belt. In some instances this relative movement of the work and belt transversely of the latter has been effected by reciprocating the belt relatively to the table but this requires the provision of operating mechanism whose parts are very apt to be so seriously injured by the grit of the sand paper as to greatly curtail their life of usefulness. In view of this, one object contemplated by the present invention is to provide an arrangement whereby the article will successively engage different portions of the belt without the necessity of imparting any movement to the belt except a longitudinal movement such as is always necessary for performing a sanding operation on the article.

A further object is to so arrange the table as to permit varying its angular relation with respect to the working face of the belt so that beveled edges may be readily dressed or sanded.

For finishing or sanding fluted edges or edges having comparatively short radii, machines of this character embody a second work supporting table, known as the end table, which is so positioned relatively to one of the spindles on which the belt is carried as to permit the edges of the articles of such formation being worked upon or sanded by that portion of the belt which is in contact with said spindle. With this arrangement it has heretofore been proposed

to work upon curved edges of varying radii by supplying a series of interchangeable spindles of different diameters so that by using one or another of said spindles, depending upon the radius of the curve in the edge of the article, curved edges of different radii could be sanded. As this, however, requires the removal of one spindle from the machine and a substitution of another therefor, and consequently necessitates stopping the machine each time such a substitution of spindles is made, another object of this invention is to provide a battery of spindles or other belt supporting surfaces of varying radii which are always so associated with the belt as to permit any one of such supporting surfaces to be substituted for another without stopping the machine. Stoppage of the machine is not only eliminated by this arrangement, but by having the series of spindles permanently associated, so to speak, with the belt, the change from one spindle to another may be done much more expeditiously than would be the case where one spindle must be actually removed from the machine to permit substitution of another. In connection with this end table arrangement the present invention also contemplates the provision of means which will effect a relative movement of the work and belt without the necessity of reciprocating the spindles carrying the belt as in the previous practice hereinbefore outlined.

In the present case the end table is also adjustable with respect to the working face of the belt as to permit beveled edges being worked upon and said table is also adjustable transversely of said working face in order that the work may be caused to engage against any desired portion of the belt.

With these and other objects in view the invention consists in certain novel details of construction and combinations and arrangements of parts all as will be hereinafter more fully described and the novel features thereof particularly pointed out in the appended claims.

In the accompanying drawings,—

Figure 1 is a front elevation of an edge or spindle sander wherein the present improvements, in their preferred form, are embodied.

Fig. 2 is an end view taken from the end at which the end table is located.

Fig. 3 is a vertical sectional view on the line 3—3 of Fig. 1, looking in the direction of the arrows.

Fig. 4 is a top plan view of the apparatus shown in Fig. 1.

Fig. 5 is a similar view of that end portion of the machine at which the spindles for co-operating with the end table are located.

Fig. 6 is a horizontal sectional view of that portion of the apparatus illustrated in Fig. 5.

Fig. 7 is a vertical sectional view taken on the line 7—7 of Fig. 4, only a portion of the spindle head being shown.

In the machine as illustrated, the main frame 10 has mounted thereon a motor 11 for driving a spindle 12 around which and a spindle 14, or other belt supporting member at the opposite end of the frame, there extends the endless belt 13 of some suitable abrasive material such as sand paper, depending upon the nature of the object to be finished or dressed. It will be understood, of course, that power may be applied for rotating spindle 12 in various ways but in the commercial development of the machines at the present time it has been found quite advantageous to have the spindle driven by the motor as the latter can be carried on the frame 10. Power derived from the motor may also be utilized for other purposes which will become apparent during the following description of the machine.

As is understood, rotation of spindle 12 causes a longitudinal movement of the continuous belt 13 and as before explained either the portion of the belt contacting with spindle 14, or other belt supporting member, may be utilized for working upon articles, or the front reach of said belt may be utilized depending upon whether or not the edge of the article is substantially plane or whether or not its perimeter is of fluted formation.

In order that the front reach of said belt may be used it is suitably supported from its rear by a backing 15 carried on brackets 16 mounted on a bed plate 17 of the frame 10. The brackets 16 are adjustable transversely of the bed plate 17 so that the backing may be moved toward or from the side work table 18 which is carried by the frame and positioned immediately in front of the outer face of the belt 13. Likewise, the backing 15 is adjustable in the brackets 16 so as to permit said backing to be adjusted in a plane more or less at right angles to the work supporting surface of said table. These adjustable connections for the backing 15 and brackets 16 are illustrated in a general manner by the threaded bolts secured in said backing and bed plate and having their ends projecting through slots in the bracket, ordinary thumb nuts on the projecting ends of nuts being used for clamping either the bracket or the backing in adjusted position. Assuming that

the belt 13 is being driven from the left towards the right as viewed in Fig. 1, it will be seen that an article on the table 18 may be forced by the operator against the working face of the belt 13, the article usually being moved on said table in a direction opposite to that in which the belt is traveling while it is held against said belt.

In the absence, however, of any means for preventing the edge of the article engaging a zone of the belt corresponding in width to the thickness of the edge of the article being worked upon it will be appreciated that wear upon the belt will be limited to a zone whose width corresponds to the thickness of the article. It is for this reason that in some of the previous machines the spindles, together with the belt, have been reciprocated transversely of the belt so as to cause the article to successively engage different parts of the belt thereof. In the present case, however, this same result is accomplished without the use of any operating mechanism such as has heretofore been used for reciprocating said spindles. In the preferred construction for this purpose the work supporting surface of side table 18 is inclined longitudinally of the belt so that as the article is forced against the belt and is moved longitudinally of the belt in a direction opposite to that in which said belt is traveling, that is, when the article is moved from the right to the left as viewed in Fig. 1, it will be gradually moved upwardly or transversely of the working face of the belt so as to engage successively higher points or zones of the latter. In this way, the area of the belt affected or worn by the article is not limited to the thickness of the article but, on the contrary, the wear on the belt is distributed over a larger zone, depending entirely upon the degree of inclination given the working table.

While the table 18 may be supported on the frame in various ways, one convenient way is to provide fixed brackets 19 on the frame to which brackets 20 carrying said frame are pivoted, as at 21, said brackets 20 also being connected to the bracket 19 by an adjustable connection. For instance, this connection may be in the form of threaded bolts 22 extending through brackets 19 and slots 23 in brackets 20 and having on their protruding threaded ends the thumb nuts 24 whereby the table 18 may be moved around its pivotal center so as to vary its inclination with respect to the working face of belt 13, laterally of frame 10. By loosening the pin and slot connection and lowering the outer edge of the table, beveled edges may be operated upon by the sander. A simple and convenient way of supporting the table 18 at an inclination longitudinally of belt 13 consists in interposing a shim 25 between the table and the bracket 20 at the end of the table which it is desired to elevate.

It is also desirable to have the table vertically adjustable on the frame so it can be moved bodily transversely of the working face of the belt 13. A convenient arrangement for accomplishing this result consists in forming the brackets 19 on slides 26 which are movable in ways 27 on frame 10 and to which slides there are pivotally connected levers 28 whose inner or proximate ends loosely engage in recesses in a traveling nut 29 on a screw 30 journaled in the frame 10. Levers 28 are fulcrumed at a point intermediate their length on links 31 pivotally mounted on frame 10 and by rotating hand wheel 32 and screw 30 the traveling nut 29 may be raised or lowered and, through levers 28, a reverse movement imparted to the slides 26.

Referring now to the end table 33 which is used when articles are to be operated upon by the portion of the belt in contact with the spindle 14 only a brief description of the manner in which said table is mounted need be given as the arrangement is quite similar to that in the case of said table 18. Suffice it to say that said table 33 is adjustable toward and from spindle 14 by means of a pin and slot connection indicated generally at 34 and the angular relation between said table and belt can also be varied by the pin and slot arrangement indicated generally at 35 between the brackets 36 and 37 for supporting the table from a slide 38 on which both of brackets 37 are formed and which is movable in a way formed at the end of the machine so as to permit the table to be adjusted vertically or transversely of the working face of the belt. The construction of these ways, slides and brackets may, of course, be varied but in the present instance they are substantially as those described in connection with the side table except that there is a web 39 for strengthening the pair of brackets 37 formed on the slide 38.

Instead of inclining one end of table 33 so that the area of the belt worn by the article will not be limited to the thickness of the article, said table is adapted to be reciprocated transversely of the belt, or, in the present instance, vertically in the frame, this reciprocatory motion being preferably imparted to said table by means of links 40 pivoted at one end to the slide 38 and at their opposite ends to pitman 41 connected to a crank wheel 42 which is driven by a worm wheel 43 cooperating with a worm 44 driven by motor 11. The extent of the reciprocatory motion imparted to table 33 is regulatable, this being accomplished as by having the pitman so connected to the crank wheel 42 to permit the point of connection being adjusted toward or from the center of said wheel. A connection of this nature is shown generally and consists of a threaded screw extending through a slot 45 in the pitman and having its inner end slidably secured in ways 46

provided on the crank wheel, the pitman being adapted to be clamped in any of its adjusted positions by means of a nut 47 on said screw. In order that the motion of the pitman will effect a reciprocation of the table said pitman is pivotally supported intermediate its ends as by a screw 48 in a block 49 so that when the end of the pitman connected to the crank rises and falls the opposite end to which the link 40 is connected will be moved in the reverse direction.

As will be seen from Figs. 4 to 6 the end table 33 is cut away to clear the end of belt 13 so that it may be raised above the bottom edge of said belt if it should be desired to adjust the table to a point above said edge. This form of mechanism for adjusting the table transversely of the belt consists in having the block 49 slidably mounted in continuations of ways 27 and providing a threaded shaft 50 which extends through said block and is journaled in its ends in adjacent portions of the frame. At its lower end this shaft 50 has a hand wheel 51 whereby the block 49, which is in the nature of a nut, may be elevated or lowered, this movement of the nut causing end of pitman 41 to which is connected the link 40 to be raised or lowered and consequently raising or lowering the slide 38 and table 33.

As has hereinbefore been mentioned the end table 33 is used when the edges having curves of more or less short radii are to be sanded and as also previously mentioned it has usually been the practice to substitute one spindle of one diameter for a spindle of another diameter when the curvatures of the edges of two pieces of work differ. This substitution of spindles is, of course, a time consuming transaction and in order that the present machine may be more expeditiously adapted for pieces of work having curved edges of different radii a plurality of elements for supporting that portion of the belt, adjacent table 33, are so arranged on the frame between the reaches of the belt as to permit any one of them to be quickly moved into operative relation with respect to said table. These belt supporting elements may be ordinary spindles as illustrated at 14, 14^a, in addition to which there may also be a form 52 having a convex surface and a form 53 having a concave belt supporting surface. Any one of these belt supporting elements may be positioned to so support the belt as to permit an article on the table 33 to be forced against the belt at the point where the belt passes over the surface of said element. Any number of spindles or any number of these so-called forms may be utilized, although only two of each are shown.

A convenient construction of supporting

this battery of spindles and forms in the position where they may be operatively associated with the end table 33 consists in providing what might be termed a spindle head 54 rotatably mounted on a pin 55 supported from the frame 10. The pin 55 may be formed with a head 56 that is slidable in a way 57 in a plate 58 on the frame, said way extending transversely of the main frame 10 whereby said head and the elements carried thereby can be adjusted transversely of the machine so as to properly position any one of the elements with respect to table 33 as well as to prevent the front reach of the belt being moved away from the backing 15. The pin 55 should also be held against rotation, as by having the head 53 of square cross section and spindle head 54 can be locked against rotation by clamping it and its hub 59 between the plate 58 and a nut 60 screwed on the pin. The spindles can be supported on the head 54 in various ways, as by having them loosely held on shafts mounted in the head, the upper ends of the shafts being supported in sleeves 61 carried by brackets 62 secured in a collar 63 held on pin 55 between the locking nut 60 and hub 59 of the head. The sleeves 61 may, if desired, be in the form of nuts screwed on the shafts but not turned tight enough to bend the spindles. For securing the forms 52, 53 on the head, the hub of the latter may have ribs 64 thereon whose side faces are undercut so as to cooperate with a groove 65 of similar cross-sectional contour in the forms, the forms being slipped on or off the hub by a movement lengthwise of the pin 55. The spindles and forms are shown in different positions in Figs. 4, 5 and 6, the head being free to effect this adjustment upon loosening nut 60. To remove either of the spindles, nut 60 and collar 63 carrying arms 62 must be removed from pin 55. It will be obvious that the length of belt 13 must be variable or the head 54 must be adjustable toward and from spindle 12 to permit adjustment of the various spindles 14, 14^a or forms 52, 53. Preferably this is taken care of by having the plate 58 formed on or carried by a plate 66 which is slidable longitudinally on the frame 10, said plate having a groove 67 therein formed with undercut side faces which are adapted to engage the beveled side edges 68 of one of the members of frame 10. In the embodiment of the invention illustrated, plate 66 has a depending portion 69 in which there is a groove 70 for the slide 38 on which the end table 33 is supported. With this construction, the head may be adjusted transversely of the frame, or it may, together with plate 66, be moved lengthwise of the frame. The head will be locked against such transverse movement by reason of nut 60 pulling head 56 of pin 55

up against the top face of groove 38 and said head can be locked against longitudinal movement by forcing set screw 71 against the bevel edge 68 of frame 10 or against a shim if one is used between said bevel edge and plate 66, as shown in Fig. 7.

Belt 13 must, of course, be kept under tension and for this purpose plate 66 may be provided with a recess 72 in which engages the free end of a lever 73 pivoted on frame 10. Belt 13 tends to move plate 66 and lever 73 toward the right in the illustration of Fig. 1, but said lever may be forced in the opposite direction as by a threaded shaft 74 in frame 10, a hand wheel 75 being provided on said shaft to facilitate its operation. By forcing said lever and plate away from spindle 12 the belt can be placed under proper tension, lever 73 having sufficient resiliency to compensate for any minor movement of the head while the machine is in operation.

While specific descriptions have been given of the preferred arrangements for conveniently accomplishing the primary objects of the invention, the following claims are not to be limited to the various details of construction except where such details have been expressly included.

What I claim is:

1. In an edge sander, the combination of a frame, an endless traveling belt of abrasive material, a driving spindle for supporting the belt at one end of the reaches thereof, a sliding member carried by the frame, said member being slidable parallel to the plane in which said belt travels, an end table supported in said sliding member, and a belt supporting member carried on said sliding member for supporting the other ends of the reaches of the belt.

2. In an edge sander, the combination of a frame, a horizontally disposed endless traveling belt of abrasive material, a driving spindle for supporting the belt at one end of the reaches thereof, a sliding member carried by the frame, said member being slidable parallel to said belt, an end table supported in said sliding member, and a plurality of belt supporting members having convex and concave surfaces mounted on said sliding member, all of said belt supporting members being adapted to be moved into operative relation to the belt and end table.

3. In an edge sander, the combination of a frame, an endless traveling belt of abrasive material, a driving spindle for supporting the belt at one end of the reaches thereof, a sliding member carried by the frame and movable in a plane parallel to that in which said belt travels, an end table supported in said sliding member, a belt supporting member carried on said sliding member for supporting the other ends of the reaches of the belt, and means for urg-

ing said sliding member away from the driving spindle with a regulatable pressure.

4. In an edge sander, the combination of a frame, a horizontally disposed endless traveling belt of abrasive material, a driving spindle for supporting the belt at one end of the reaches thereof, a sliding member carried by the frame, said member being slidable parallel to said belt, an end table supported in said sliding member, and a belt supporting member carried on said sliding member for supporting the other ends of the reaches of the belt, a crank wheel journaled in said frame, a pitman connected to said crank wheel and said end table for reciprocating said table in the sliding member transversely of the belt, and means for driving said driving spindle and rotating said crank wheel.

5. In an edge sander, the combination of a frame, a horizontally disposed endless

traveling belt of abrasive material, a driving spindle for supporting the belt at one end of the reaches thereof, a sliding member carried by the frame, said member being slidable parallel to said belt, an end table supported in said sliding member, and a belt supporting member carried on said sliding member for supporting the other ends of the reaches of the belt, a crank wheel journaled in said frame, a pitman connected to said crank wheel and said end table for reciprocating said table in the sliding member transversely of the belt, means for rotating said crank wheel, and means for adjusting the end table and the end of the pitman connected thereto transversely of the belt whereby the reciprocating motion of the end table may be confined to a predetermined area or zone transverse-ly of the belt.

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