To all whom it may concern:

Be it known that I, Frederic A. Phelps, of Newark, New Jersey, a citizen of the United States of America, residing in Newark, county of Essex, State of New Jersey, have invented

an Automatic Hammer-Handle-Sanding Machine, of which the following is a specification.

The object I have in view is the production of a machine for automatically sanding wooden hammer handles and analogous articles, such as spokes, tool handles, etc., in which the work will be uniformly expeditiously and economically accomplished. I attain this object by the mechanism illustrated in the accompanying drawings, in which

Figure 1 is a side elevation of an apparatus embodying my invention, showing the sanding belt in section, the full lines showing parts of the machine at the end of the operation, and the dotted lines the positions they assume when the operation is about to begin. Fig. 2 is a section on the line 2—2 of Fig. 1, showing the sanding belt and the supporting and actuating pulleys thereof. Fig. 3 is a plan view, Fig. 4 is a rear elevation, Fig. 5 is a section on the line 5—5 of Fig. 3, Fig. 6, a front elevation, Fig. 7 an enlarged view of the nut and screw and Fig. 8 is a modified form of tail stock.

In all of the views, like parts are designated by the same reference characters.

In carrying out my invention, I provide the usual endless sanding belt 1 which is shown as supported upon the pulleys 2 and 3, the latter being rotated by means of a belt 5. The work 9, shown in this embodiment of the invention as a hammer handle, is supported in contact with the belt 1 and rotated and moved in the direction of its length across such belt, so that the entire work will be completely sanded. The device for supporting the work is mounted upon a base 5 which rests between the supports for the belt. This base has secured to it a table 6 which extends some distance on one side beyond the base 5 so that the belt may work under it (see Fig. 1). This permits an endless belt to be used and to be removed and replaced without affecting the base 5, and the mechanism carried upon it. The table 6 has supported upon it a tilting platform 7 which is hinged to the table at 8, so that it may be moved from the solid to the dotted-line position, Fig. 1. The other end of the tilting platform 7 rests upon the springs 9 and is held in a horizontal position, with the springs compressed, by means of a latch 10. This latch is carried up in an elastic plate having a slot through which bolts 11 pass, securing it to the table 6, the slot permitting vertical adjustment of the latch 10. The flat plate of which the latch is made is sufficiently elastic to cause it to automatically engage when the tilting platform is lowered. The tilting platform is lowered by means of a link 12 connected to a pedal 13 within convenient reach of the operator.

A sliding carriage 14 moves within ways 15 in the tilting platform 7. This sliding carriage has a support 16 at one end for a shaft 17, which carries a chuck 18. At the other end, the sliding carriage 14 has a support 19 which carries a center 20. This center slides in and out of the support 19 and is normally forced out by means of a spring 21; it is drawn in by means of a rod 22 connected to a lever 23.

The end of the center 20 is provided with an annular point like the tail stock of a lathe. The chuck 18 is provided with a rectangular opening 24 which will fit the end of the work. The shape of the opening, of course, may vary according to the form of the work. The face of the chuck is curved as shown, so that the belt will engage with that portion of the work which if in immediate contact with the chuck, the belt, is necessary, coming in contact with the curved face of the chuck to allow this to be done.

The shaft 17 carries a sprocket 25, by means of which it is turned. This sprocket is rotated by means of a chain 26 which engages with a second sprocket 27. The sprocket 27 is mounted upon a shaft 28, which is arranged below the tilting platform 7 and parallel therewith. The shaft 25 is mounted in bearings 29, 30, 31, which depend from the sliding carriage 14, under the support 16, and under the bearing 30 which depends below the support 19. The shaft 25 also turns within bearings 31, 32 which depend from the tilting platform 7. A spur gear 33 is carried by the shaft 28 between the bearings 31, 32 and rotates the shaft by means of a leather sliding in a slot 33 in the shaft 28. The spur gear 33 is rotated by means of a gear 34, which in turn is rotated by a pulley 35; a belt 36 rotates the pulley 35. The portion of the shaft 28 between the bearings 29 and 30, is formed as a screw 36, which is made either separately or integrally with the rest of the shaft. This screw may be caused to engage with a nut 37, which nut is mounted between standards 38 carried by the table 6, and is free to move up and down, but not in any other direction. The nut 37 engages with only the lower half of the diameter of the screw (see Fig. 2) so that the screw may be elevated out of the nut. The support for the nut 37 has a reduced portion 39 which passes through an opening in the table 6. A spring normally elevates the nut 37 and a pin 41 limits its upward movement.

The carriage 14 is free to slide within the ways 15 carrying with it the shaft 28 and screw 36, the former freely sliding through the bearings 31, 31 and sprocket 105 wheel 32. A pin 42 is carried by the carriage 14 and
is adapted to be forced into engagement with the latch 10 when the carriage has completed its full extent of movement. The length of this pin is adjustable so that it may trip the latch 10 sooner or later, depending upon circumstances. Adjustability is secured by screwing the pin 42 into a tapped opening in the bearing 50 and providing a lock nut for holding it in position. A buffer 45 of wood, rubber, or any other suitable material is provided and is adapted to engage with the support 16 or any other portion of the moving carriage 14, when the latter is returned to the full extent of its movement. A weight 44, carrying a sheave 45 which engages within the bight of a rope or chain 46 is employed for returning the carriage 14 to the position which it must assume at the beginning of each operation. This rope or chain passes over a sheave 37 on the tilting platform 7, one end being secured to the platform and the other to the carriage. The sheave 47 is mounted in bearings beyond the standards 38 of the pivot of the tilting platform 7, so that the weight 44 will tend to tilt the platform upon the pivot and will hold it in its elevated position. The support 16 is adjustable upon the carriage 14 so that the distance between the chuck and the tail-stock may be varied to suit the character of the work. This adjustment is made by means of a bolt 48 engageing within a slot in the sliding carriage 14.

The operation of the machine is as follows: One end of the work 9 is introduced within the chuck 18, and the other within the center 20. The base 5 is arranged in relation to the belt 1, shown in Fig. 1, and the pulley 35 is connected to a belt and rotated. This rotates the shaft 33 and screw 36 by means of the spur gears 32 and 34, but as the tilting platform 7 is normally elevated by means of the springs 9, the screw 36 will be disengaged from the nut 37. By depressing the pedal 13, the tilting platform 7 will be brought down, compressing the springs 9 and engaging the latch 10 so as to hold the tilting platform 7 in position. This will engage the screw 36 with the nut 37. The screw being constantly rotated and the nut being stationary, the screw will be drawn along and with it the sliding carriage 14. As soon as the sliding carriage is depressed, the work 9 will be lowered upon the belt 1. The work is placed within the chuck above the belt 1. Simultaneously with the rotation of the shaft 28 and the screw 36, the chuck 18 will be rotated by means of the chain 26, the sprocket wheel 25 and the sprocket wheel 27; consequently the work will be rotated. The work will therefore be moved along in the direction of its own length over the belt and will be pressed against it. The amount of pressure may be determined by the adjustment of the length of the latch 10. When the sliding carriage 14 has moved to the full extent of its travel, the pin 42 will engage with the latch 10 and disengage the latter from the tilting platform 7. The springs 9 being under compression, will elevate the platform, tilting it upon its pivot 8 and disengaging the screw 36 from the nut 37. The weight 44 will then draw the carriage 14 backwards until the support 16 comes in contact with the buffer 45, whereupon the apparatus will be ready to have the second work removed and another piece of work substituted. During the tilting movement the teeth of the gear 32 slide upon the teeth of the gear 34, but the width of the gears is so proportioned that they do not mesh. It is to be understood that there is no work for the gears to perform when the sliding platform 7 is tilted. Therefore no trouble is occasioned by having one gear slide upon the other.

The apparatus, in practice, is found to work with great economy as the attendant can see that portion of the work which lies within the opening 24 of the chuck 18 while another article is being sanded by the machine.

In order to prevent injury to the threads of the screw 30 when they strike the nut 37, the former are preferably made of the shape shown in Fig. 7, so that the threads of the screw will gently come into mesh with the threads of the nut when the tilting platform 7 is lowered.

The apparatus may be used in connection with handles and implements of all kinds and is particularly useful in connection with the sanding of spades, although it is primarily designed for sanding of hammer handles. The work done by it is much superior to that done by hand, as the work is steadily and positively rotated, and moved in the direction of its length, so that splints and defects in the wood are, to some extent, scraped away, while in hand work any splints or defects will be multiplied by the sanding operation as the operator in turning the work upon the belt will naturally stop it at an irregularity, such as a defect or split, and grind that portion of the work more than the other portions.

In Fig. 8 is shown a modified form of tail-stock in which the work will be automatically centered and the center 20 will be caused to engage with the work in its center.

Adjustably mounted on the end of the sliding carriage 14, opposite the chuck 18, is a standard 50 carrying near its upper end a hollow barrel 51 and a bearing 52. Within the standard 50 is slidably mounted a shaft 53 which is provided with a squared portion 54 which will prevent the shaft from turning in the barrel, but which will permit of its longitudinal movement. The outer end of the shaft is cuffed to form the center 20. On the inner end of the shaft 53 is slidably mounted a collar 56 which is provided with a pin or roller 57 which projects through a slot in the barrel and which engages with a cam 57 secured to a shaft 55 which in turn is carried in the bearing 50. To the outer end of the shaft 53 is splined a cup 58 which may revolve with and slide longitudinally on the shaft 53 and has journaled on its inner end a collar 60 which is provided with a pin or roller 61 which engages with a cam 62 secured to the shaft 55. The shaft 58 is provided at one end with a crank 63 which is provided with a spring catch which may engage with notches in the standard 50 to limit the rotary movement of the crank 63 and cam 57 and 62.

The shaft 53 is held in its normal outward position by means of a spring 64, and the cup 59 and collar 60 are cushioned against the barrel 51 by a similar spring 65. The shaft 53 is provided with an integral collar 125 60 which carries a series of springs 67 which will allow slight relative movement between the shaft and the collar 65, and the rear face of the cup 59 is provided
with similar springs 68 to permit of relative movement of the cup and collar 60.

The operation of the modified form of tail-stock, as described above (assuming it to be used in place of, and as a substitute for, the tail-stock 19 of Fig. 1) is as follows: The apparatus being in the position shown in dotted lines in Fig. 1, and the finished handle removed, the rectangular end of a rough turned handle may be inserted in the cavity of the chuck and its other end brought into approximate alinement with the center of the tail-stock. The crank 63 may now be rotated and with it the cams 57 and 62, and the first result of this movement will be to advance the cup 59 until it comes into contact with the handle, and will automatically center it. The continued rotation of the crank will cause the shaft 53 to be moved forward until it comes in contact with the handle, and as the handle has been centered in the cup, the cupped end of the shaft will engage exactly in the center of the handle.

When the center has come into engagement with the end of the handle, the continued movement of the crank will draw the cup farther from the end of the handle, leaving the latter supported between the clutch and the center. The further revolution of the handle will cause the sharp edges of the cupped end of the shaft 58, which forms the center, to cut into the handle, the shaft being forced forward by the springs 67. The springs 68 are for the purpose of allowing the cup 59 to accommodate itself to handles of slightly different lengths. When the handle has been sufficiently sand-eled, the crank may be given a backward turn, when the center and cup will be withdrawn from contact with the handle and the latter removed from the machine.

In accordance with the provisions of the patent statutes, I have described the principle of my invention, together with the apparatus which I now consider to represent the best embodiment thereof; but I desire to have it understood that the apparatus shown is merely illustrative and that the invention can be carried out in other ways.

Having now particularly described and ascertained the nature of my invention, what I claim and desire to secure by Letters Patent is:

1. An apparatus for sanding work, having a support, a tilting platform pivoted thereto, and a sliding carriage, means for supporting the work upon the carriage, means for moving the carriage along the platform, and means for tilting the platform.

2. A device for sanding work, comprising a support, a tilting platform, a sliding carriage and means for supporting the work upon the carriage, a screw for rotating the carriage, means for rotating the screw, and a fixed nut on the support.

3. A device for sanding work, comprising a support, a tilting platform, a sliding carriage on the tilting platform, a shaft, a screw depending from the carriage, a fixed nut on the support, gears for rotating the shaft and a connection between the shaft and the gears for permitting the shaft sliding within the gears, and means for supporting the work upon the sliding carriage and means for rotating the work, such means being operated from the shaft.

4. A device for sanding work, comprising, in combination, a support and a tilting platform, a sliding carriage on the platform, means for tilting the platform, a latch for preventing tilting, and means for moving the carriage to disengage the latch.

5. In a device for sanding work, the combination of a support and a tilting platform, a sliding carriage on the platform, a work-holding means on the carriage, means for rotating the work-holding means, a shaft, a screw on the carriage and moving with it, a fixed nut on the support, connections between the shaft and the work-supporting means for rotating the shaft, means for tilting the carriage, a latch for preventing tilting, means carried by the carriage for freeing the latch, and means for moving the carriage in the opposite direction to the movement caused by the screw.

6. A device for sanding work, the combination of a support and a tilting platform, a sliding carriage on the platform, a work-holding means on the carriage, means for rotating the work-holding means, a shaft, a screw on the carriage and moving with it, a fixed nut on the support, connections between the shaft and the work-supporting means for rotating the shaft, means for tilting the carriage, a latch for preventing tilting, means carried by the carriage for freeing the latch, and means for moving the carriage in the opposite direction to the movement caused by the screw.

7. In a device for sanding work, the combination of a support and a tilting platform, a sliding carriage on the platform, a work-holding means on the carriage, means for rotating the work-holding means, a shaft, a screw on the carriage and moving with it, a fixed nut on the support, connections between the shaft and the work-supporting means for rotating the shaft, means for tilting the carriage, a latch for preventing tilting, means carried by the carriage for freeing the latch, and means for moving the carriage in the opposite direction to the movement caused by the screw.

8. A device for sanding work, the combination of a support and a tilting platform, a sliding carriage on the platform, a work-holding means on the carriage, means for rotating the work-holding means, a shaft, a screw on the carriage and moving with it, a fixed nut on the support, connections between the shaft and the work-supporting means for rotating the shaft, means for tilting the carriage, a latch for preventing tilting, means carried by the carriage for freeing the latch, and means for moving the carriage in the opposite direction to the movement caused by the screw.

9. An apparatus for sanding work, having a supporting frame, a tilting platform thereon, a sliding carriage, a chuck carried on the carriage for supporting one end of the work, a tail-stock for supporting the other end of the work, and means for automatically centering the work on the tail-stock.

10. An apparatus for sanding work, having a supporting frame, a tilting platform thereon, a sliding carriage, a chuck for supporting one end of the work, means for revolving the work, a tail-stock for supporting the other end of the work and a cup for automatically centering one end of the work on the tail-stock center.

11. An apparatus for sanding work, having a supporting frame, a tilting platform thereon, a sliding carriage, a chuck for supporting one end of the work, means for revolving the work, a tail-stock, a cup for engaging the end of the work, and a cam for engaging the cup with the work and for disengaging it therefrom.

12. An apparatus for sanding work having a supporting frame, a tilting platform thereon, a sliding carriage, a chuck for supporting one end of the work, means for revolving the work, a tail-stock, a cup for engaging the end of the work, a cam for engaging the cup with the work and for disengaging the cam therefrom, a center, and a cam for moving the center into and out of engagement with the work.

13. An apparatus for sanding work, having a supporting frame, a tilting platform thereon, a sliding carriage, a chuck for supporting one end of the work, means for revolving the work, a tail-stock, a cup for engaging the end of the work, a cam for engaging the cup with the work and for disengaging it therefrom, a center, and a cam for moving the center into and out of engagement with the work.

14. In an apparatus for sanding work, the combination with an endless sanding belt, of a frame projecting beneath the belt, a platform secured to the frame and movable relatively thereto, a carriage mounted on the platform and movable relatively thereto, means for holding the work on the carriage, means for supporting the belt, means for moving the carriage relatively thereto, means carried by the carriage for disengaging the platform from the
frame, and means carried by the platform for moving the carriage relatively to the platform and the platform relatively to the frame.

15. In an apparatus for sanding work, the combination with an endless sanding belt, of a frame, a platform secured to the frame and movable relatively thereto, a carriage mounted on the platform and movable relatively thereto, means on the carriage for holding the work, means for moving the carriage relatively to the platform, means for disengaging the platform and frame, such means being actuated by the movement of the carriage and means for moving the platform relatively to the frame.

This specification signed and witnesses this 20th day of October, 1906.

FREDERICK A. PHELPS.

Witnesses:
JAS. E. COLEMAN,
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