

(No Model.)

2 Sheets—Sheet 1.

E. B. HAYES.
DOWEL MACHINE.

No. 580,489.

Patented Apr. 13, 1897.

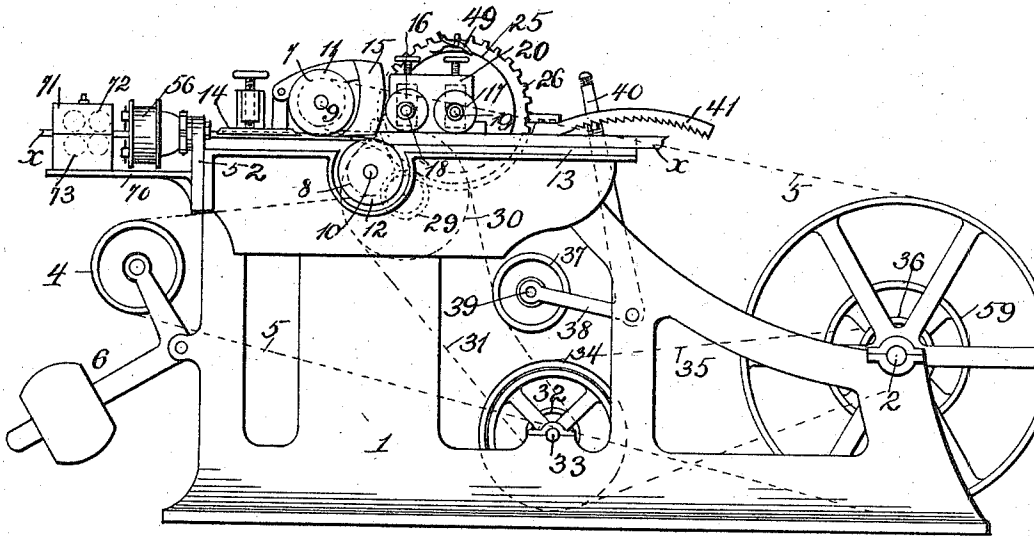


Fig. 1

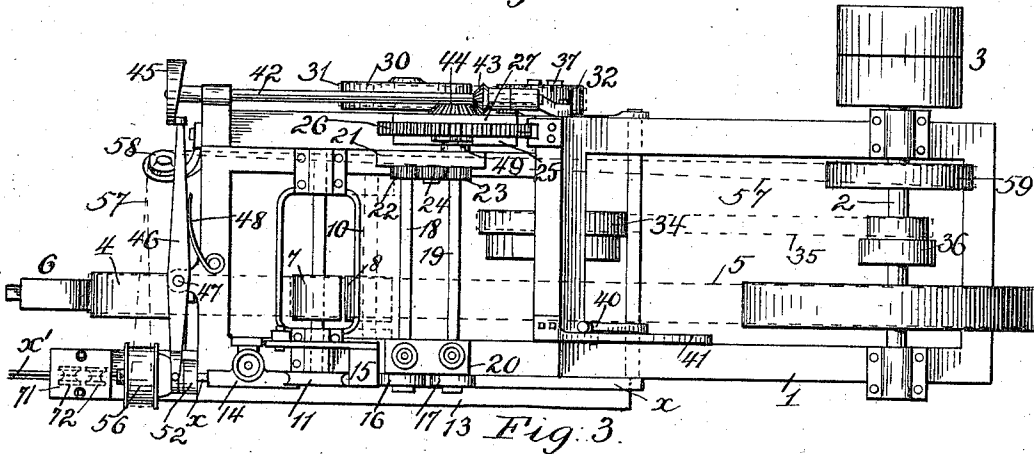


Fig. 3.

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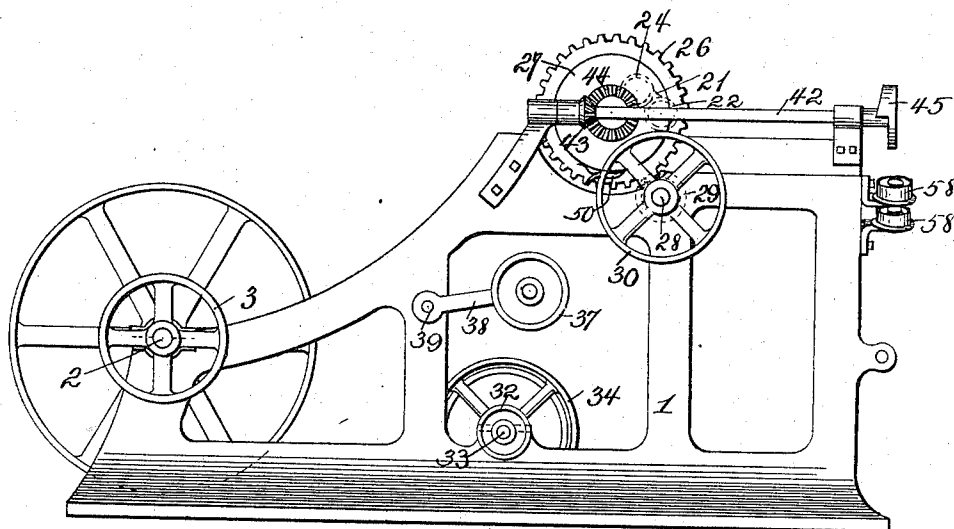


Fig. 2.

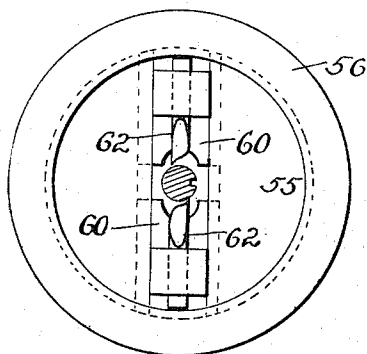


Fig. 5.

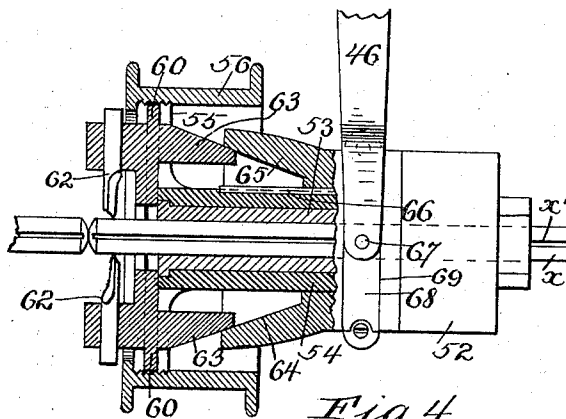


Fig. 4.

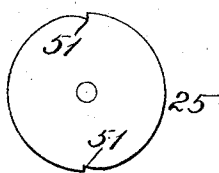


Fig. 6.

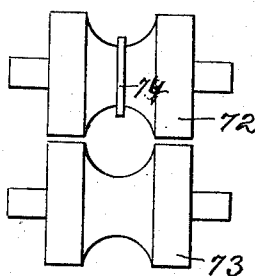


Fig. 7.

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UNITED STATES PATENT OFFICE.

ELI B. HAYES, OF OSHKOSH, WISCONSIN.

DOWEL-MACHINE.

SPECIFICATION forming part of Letters Patent No. 580,489, dated April 13, 1897.

Application filed February 13, 1895. Serial No. 538,252. (No model.)

To all whom it may concern:

Be it known that I, ELI B. HAYES, a citizen of the United States, residing at Oshkosh, in the county of Winnebago and State of Wisconsin, have invented certain new and useful Improvements in Dowel-Machines; and I do declare the following to be a full, clear, and exact description of the same.

My present invention relates to the manufacture of dowels, and has for its object to produce mechanism by which the speed of such manufacture can be greatly increased and dowels of very perfect form produced; and the invention consists in the mechanical parts and combinations thereof hereinafter set forth and claimed.

In order to make my invention more clearly understood, I have shown in the accompanying drawings means for carrying it into practical effect without limiting my improvements in their useful applications to the particular construction which, for the sake of illustration, I have delineated.

In said drawings, Figure 1 is a side view of a dowel-making machine embodying my improvements. Fig. 2 is an elevation of the opposite side of the machine. Fig. 3 is a plan view of the same. Fig. 4 is a longitudinal sectional view of the cutting mechanism by which a continuous dowel is severed into lengths forming individual dowels properly shaped at both ends. Fig. 5 is an end view of the said cutting mechanism. Fig. 6 is a view of one of the ratchets which control the time of feed of the continuous dowel-rod and the time of severing it. Fig. 7 is a plan view of two of the holding or steadying rollers which grasp the dowel which is in the act of being cut off.

I may here state that the product of this machine is especially intended for the manufacture of dowel-doors in which the dowels serve to secure together the stiles and rails, but it will be understood that said product may be employed for any other purpose in the securing together of separate frame-pieces or other parts for which it is suitable.

Referring to the drawings, 1 indicates the frame of the machine, preferably composed of metallic castings adapted in strength and

shape to the support of the mechanism hereinafter set forth.

2 is the main counter-shaft, mounted on said frame and provided with the usual fast and loose pulleys 3 for the main driving-belt. (Not shown.)

4 is a driving-pulley actuated by the shaft 2 and transmitting rotary movement through a belt 5, stretched by a tightener 6, to the pulleys 7 and 8 of the upper and lower cutter-head shafts 9 and 10. The latter are mounted in suitable bearings on the frame and carry upper and lower cutter-heads 11 and 12, arranged in the same plane and respectively above and below the path of the wooden rod or bar, ordinarily square in cross-section, to be operated upon. Each cutter-head is provided with a knife or knives arranged to stick or dress its side of the wooden rod to a convex semicylindrical shape, the result of the combined operation of the upper and lower cutters being to form a continuous cylindrical rod of the diameter desired in the finished dowel.

In addition to the above-described knives of the upper head 11, however, I provide it with a cutting-tooth of any well-known or suitable character which will produce in the upper side of the continuous dowel or rod (indicated at x) a longitudinal kerf or groove x' , by which the dowel is securely held from rotation while it is being acted upon by the knives which sever it and shape its end, as will be hereinafter more fully described. Means by which the work is held while being operated on by the said upper and lower cutters consist of a bed 13, supported by the frame 1 in line with the operative edges of the cutter-heads, upper holding plates or devices or chip-breakers 14 and 15, of any suitable character, adjustably mounted above the bed 13, and feed-rolls 16 and 17, of the usual character, carried by shafts 18 and 19 and situated above bed 13 near the lower cutting-head. Said shafts are held in bearing-brackets 20 and 21, in one or both of which their bearings may be made yielding or adjustable, and are provided with pinions 22 and 23, geared together by an intermediate idler 24. One of said feed-roll shafts, for instance, the shaft 19,

is extended beyond the bracket 21 and is provided with a fixed ratchet wheel or disk 25, a spur-gear 26, which is loose on the shaft, and a loose ratchet 27.

28 is a shaft mounted in the frame 1 and carrying a spur-pinion 29, which meshes with the gear 26 and is adapted to drive the latter and either or both of said ratchets when the latter is or are connected with it. The shaft 28 receives motion from its pulley 30, driven by a belt 31 from a pulley 32 on a counter-shaft 33 at or near the bottom of the main frame or in other suitable situation. The shaft 33 carries a pulley 34, which may have two or more faces of different diameters, whereby the speed of the feed mechanism may be regulated in a well-known manner, and said pulley is actuated by a belt 35 from a smaller corresponding drive-pulley 36 on the main counter-shaft 2. By the train of belting above described the speed of the main shaft is slowed down in its transmittal to the feed-rolls.

The belt 31 is made loose, so that it will not be actuated by the pulley 32 until it is tightened. A tightener-pulley for this purpose is shown at 37, carried by an arm 38 of a rock-shaft 39. The latter is turned by a hand-lever 40, adapted to be held in position by a rack 41. By these devices the feed mechanism may be controlled irrespective of the cutter-driving mechanism.

42 is a longitudinal shaft carrying a beveled pinion 43, which latter engages a beveled gear 44, fixed upon the outer face of the ratchet 27, and is driven by it whenever said ratchet is connected with the gear 26. At or near its end the shaft 42 is provided with a face-cam 45, adapted to engage and move backward one arm of a horizontally-oscillating lever 46, mounted upon the frame 1 by a vertical pivot 47. The lever is moved in the opposite direction when released by the cam by a spring 48. The movement of the lever 46 under the influence of the cam 45 forces into engagement with the continuous dowel-rod the cutters by which it is severed into lengths, as hereinafter described.

The means by which the gear 26 is intermittently locked alternately to the ratchets 25 and 27 consist, preferably, of pawls 49 and 50, pivotally mounted on the inner and outer faces of the gear-wheel and respectively in line with the said ratchets. The proportions of the parts being such that a half-revolution of the ratchet 25 will turn the feed-rolls sufficiently to feed the continuous dowel-rod the length of one dowel, I form in the said ratchet two diametrically opposite teeth or notches 51, Fig. 6. The pawl 49 having engaged one of the said notches under the influence of a suitable spring, the rotation of the wheel 26 will be communicated for a half-revolution to the said ratchet, feed-roll shafts, and feed-rolls. At the end of such half-revolution the pawl 49 is disengaged from the ratchet in any well-known manner, as by a fixed stop

which will be engaged by the tail of the pawl at the proper time, and the feed mechanism will remain at rest during the next half-revolution and until the pawl 49 engages the opposite notch 51. During such second half-revolution the pawl 50 is operating in a similar manner to turn the loose ratchet 27, which latter movement is communicated to the lever 46 through the parts 44, 43, 42, and 45, as already described. It will therefore be seen that a sufficient length of a continuous dowel-rod is fed forward, and that the said rod is severed during alternate half-revolutions or portions of a revolution of the gear-wheel 26.

I will now proceed to describe the means by which the individual dowels are severed from the rod and their ends at the same time suitably formed, the said form being preferably a blunt cone or frustum thereof or semispherical or slightly rounded.

52 is a bearing or bracket carried by the frame 1, in which is fixed a hollow spindle or sleeve 53 in line with the path of the dowel-rod, and through which the latter passes in its finished form after leaving the upper and lower cutters 11 and 12, Figs. 4 and 5. Surrounding said spindle is a rotary sleeve 54, formed at one end with a flange or head 55, upon which is fixed a driving-pulley 56. The latter is driven by a belt 57, Fig. 3, which passes around guide-pulleys 58, from a driving-pulley 59 on the main counter-shaft 2. The pulleys 56 and 59 are so related in size that a high speed is communicated to the head 55. The latter is formed with suitable recesses, in which are fitted and adapted to slide radially cutter-holders 60, in the outer projecting portions of which are fixed knives 62 so shaped as to operate transversely upon the continuous dowel-rod and give a conical or rounded form to the end of the cut-off dowel and also to the end of the remaining portion of said rod. The rear ends of the cutter-holders constitute cams 63, the inclined faces of which are engaged by the interior cup-shaped surface 64 of a collar or hollow sleeve 65, mounted upon the sleeve 54 and connected and rotating therewith by a feather 66. When longitudinally moved toward the holders or jaws 60, the collar 65 will cause said jaws, with their knives, to be moved radially inward to such distance as to cause said knives to operate upon the continuous dowel-rod, as already described. For this purpose the collar 65 is moved at the proper time, as already set forth, by the lever 46, one end of which is connected by pivots 67 with a ring 68, held in a groove 69 in the collar, so as to permit the rotation of the collar, but serving to actuate it longitudinally.

It is important that the twisting action of the knives 62 upon the dowel rod or stock be not permitted to have effect, as it would interfere with the proper cylindrical shaping of the rod by the cutter-heads 11 12, and it is to this end that I have formed the continuous

dowel-rod with the groove x' hereinbefore mentioned.

70 is a bracket fixed upon the frame 1 and extending beyond the point of action of the knives 62.

71 is a box supported upon the bracket 70 and in which are mounted upper and lower holding or steadying rolls 72 and 73. The edges of said rolls are so shaped as to form a substantially circular opening, Fig. 7, in line with the center of the head 55, through which opening the end of the dowel-rod can pass. The upper rolls 72 are provided with central flanges 74, adapted to engage the groove x' of the rod. When the feed mechanism comes to rest, as above described, the end of the continuous dowel-rod will have entered the box 71 and be secured between the rolls 72 73, being securely held from rotation by the flanges 74. The severing and shaping knives 62 are now brought into operation, at the end of which the severed dowel will remain in the grasp of the said rolls 72 and 73. The stock is now again fed forward, the end of the continuous rod introduced between said rolls forcing out the finished dowel, the feed comes to a rest, and the severing operation again takes place.

It will be observed that the operation of the machine is automatic throughout with the exception of the introduction of the stock into place between the bed and the feed-rolls, which is performed by hand. The rapidity of operation and capacity of the machine are very great, with consequent economy in the production of dowel-pins.

While the dowels may be entirely severed from the rod by the cutters 62, I prefer to sever them only partially, whereby the partially-severed dowel will guide the succeeding dowel into the rolls 72 and 73, or equivalent holding device, without obstruction or clogging of the machine. To this end I form the continuous rod with a series of transverse peripheral grooves of such form as to round or point both ends of the dowels and then break off the individual dowels.

The stock is continuously fed to the machine by hand in the form of a series of rods end to end.

I claim—

1. In a dowel-machine the combination, with means for forming a continuous dowel-rod of suitable peripheral shape, of a hollow transversely-rotating cutter-head through which said rod passes, cutters movable on said head, means for moving the cutters radially, and a roll arranged at the path of the rod beyond the shaping means and having a projection or projections for entering within the peripheral outline of the finished rod to hold the same, substantially as set forth.

2. In a dowel-machine the combination of means for forming a continuous dowel-rod of suitable peripheral shape, transversely-operating cutters carried about the stock and

shaped to cut the dowel and point the end thereof and of the rod, means for moving said cutters radially, and a roll arranged to engage the rod after it has been so shaped and having a projection or projections for entering the rod to hold the same, substantially as set forth.

3. In a dowel-machine the combination, with means for forming a continuous dowel-rod of suitable shape, of means for forming therein a groove or depression, a hollow transversely-rotating cutter-head through which said rod passes, cutters movable on said head, means for moving the cutters radially, and a roll having a projection or projections for entering the depression of the rod to hold the latter from rotation.

4. In a dowel-machine the combination of means for forming a continuous dowel-rod of suitable shape, means for forming therein a groove or depression, transversely-operating cutters revoluble about said rod and shaped to cut the dowel and point the end thereof and of the rod, means for moving the said cutters radially, and a rotary projection or projections for entering the depression of the rod to hold the same from rotation.

5. In a dowel-machine the combination of a hollow revoluble cutter-head, cutters movable radially thereon, means for forming a continuous dowel-rod having a groove or depression, feed-rolls acting intermittently to move a continuous dowel-rod through said head, and a rotary projection or projections for engaging the groove or depression of the rod to hold the latter from rotation.

6. In a dowel-machine the combination of feed-rolls, cutter-heads operating to form a continuous dowel-rod of suitable peripheral shape, a hollow revoluble cutter-head provided with guides through which said head the rod passes, cutters fitting said guides and radially movable therein, a single intermittent mechanism connected with said last-mentioned cutters and with the feed-rolls and common to both of the same, and a roll arranged to engage the rod after it has been so shaped and having a projection or projections for entering within the peripheral outline of the finished rod to hold the same, substantially as set forth.

7. In a dowel-machine the combination of cutters operating to form a continuous dowel-rod of suitable cross-section, feed-rolls for delivering stock to said cutter-heads, transverse cutters adapted to cut the rod, a ratchet connected with said feed-rolls, a driving mechanism connected intermittently with said ratchet, and a second ratchet intermittently connected with said mechanism and connected with and operating radially the said transverse cutters, substantially as set forth.

8. In a dowel-machine the combination of cutters adapted to form a continuous cylindrical dowel-rod, feed devices for delivering the stock thereto, a hollow cutter-head in

- axial line with the path of said rod, cutters on said head movable toward and from the rod, a transverse lever connected with said cutters for moving them radially, a cam engaging said lever, a longitudinal shaft carrying said cam, a driving mechanism, and means for alternately connecting said mechanism with said longitudinal shaft and with said feed devices, substantially as set forth.
- 10 9. In a dowel-machine the combination with the upper and lower cutter-head and the transverse cutter-head, of feed devices or rolls, a driving-gear carrying pawls, ratchets on opposite sides of said gear, connections between one of said ratchets and said feed devices, and connections between the other of said ratchets and the cutters of said transverse cutter-head, substantially as set forth.
- 15 10. In a dowel-machine the combination with means for longitudinally grooving the dowel-rod, and revoluble transversely-acting substantially-severing cutters, of the grasp-

ing-rolls adjacent to said cutters provided with a flange 74.

11. In a dowel-machine the combination with a hollow rotary cutter for transversely cutting and substantially severing a dowel-rod, and means for forming a groove therein, of a holding projection adjacent said cutter and entering said groove to resist the rotary force of said cutter, substantially as set forth.

12. In a dowel-machine the combination of means for longitudinally grooving a dowel-rod, a revoluble cutter-head, radially-movable cutters thereon, means for moving said cutters inward to sever or substantially sever the rod, and a holding device adjacent to said cutters adapted to enter said groove.

In testimony whereof I affix my signature in presence of two witnesses.

ELI B. HAYES.

Witnesses:

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TIM. THOMAS.