3 Sheets—Sheet 1.

# J. B. DOUGHERTY.

## Barrel-Hoop Machine.

No. 211,715. Patented Jan. 28, 1879.

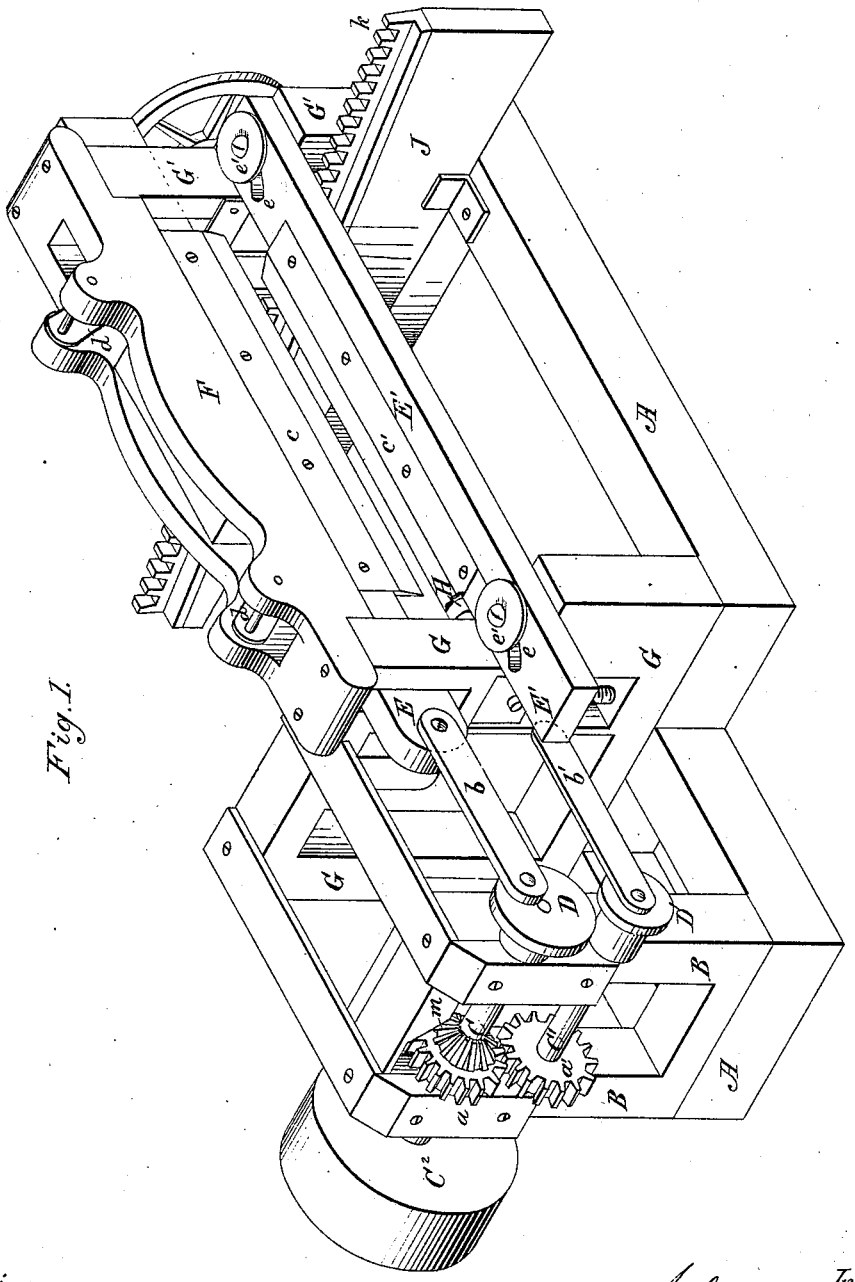

Fig. 1.

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# J. B. DOUGHERTY.
## Barrel-Hoop Machine.

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*Fig. 2.*

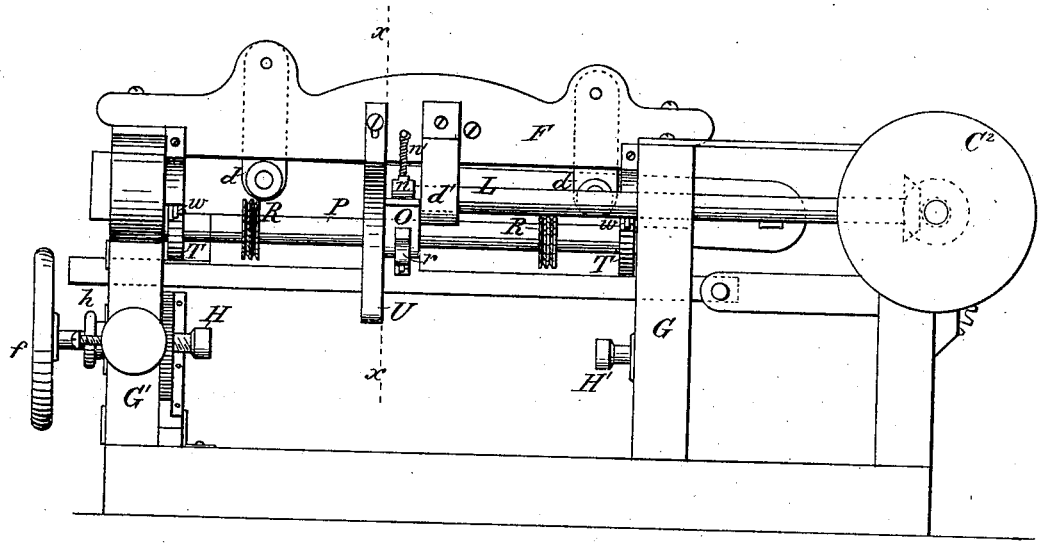
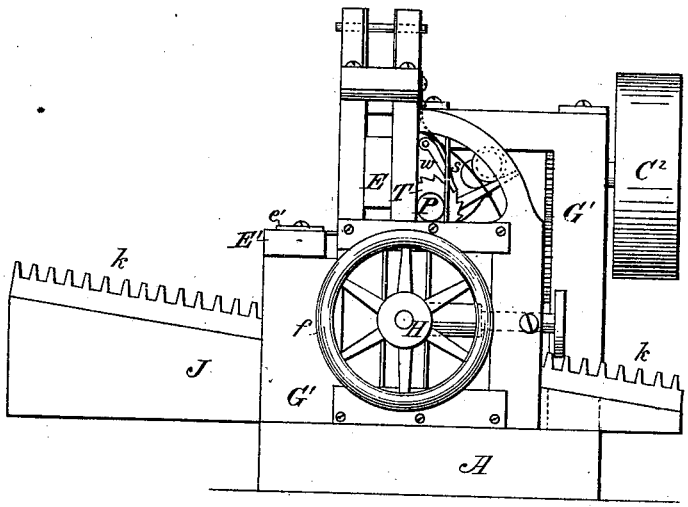



*Fig. 3.*

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# J. B. DOUGHERTY.

## Barrel-Hoop Machine.

**No. 211,715.** **Patented Jan. 28, 1879.**

*Fig. 4.*

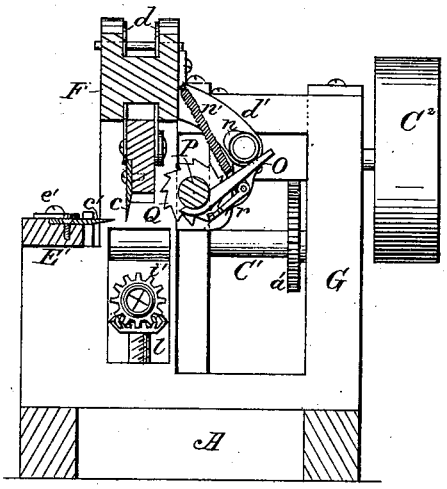



*Fig. 5.*

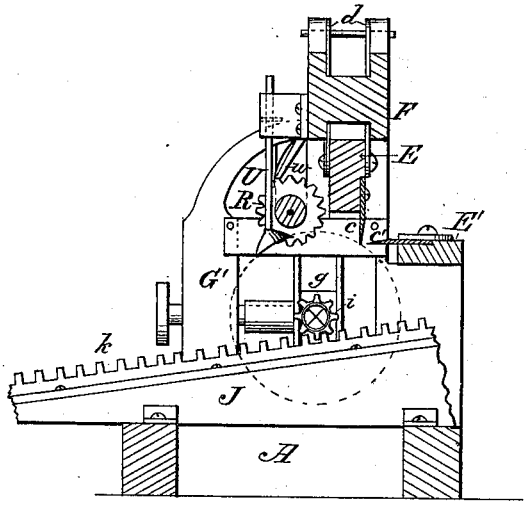



*Fig. 6.*

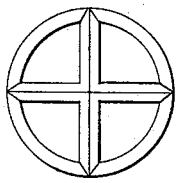
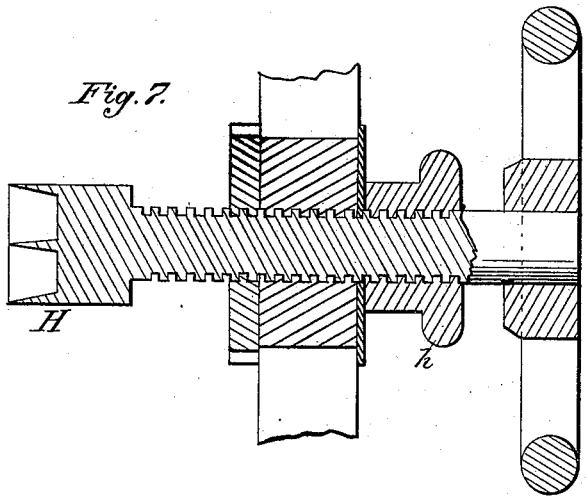


*Fig. 7.*

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*Inventor:*
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# UNITED STATES PATENT OFFICE.

JOHN B. DOUGHERTY, OF ROCHESTER, ASSIGNOR TO BURRELL, IVES & CO. AND DAVID H. BURRELL, OF LITTLE FALLS, NEW YORK.

## IMPROVEMENT IN BARREL-HOOP MACHINES.

Specification forming part of Letters Patent No. **211,715**, dated January 28, 1879; application filed October 23, 1878.

*To all whom it may concern:*

Be it known that I, JOHN B. DOUGHERTY, of Rochester, in the county of Monroe and State of New York, have invented certain new and useful Improvements in Machines for Cutting Hoops Directly from the Log; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

This invention relates to that class of hoop-cutting machines in which the hoops are severed directly from the log without any previous preparation of the latter, such as sawing or cutting it into planks or veneers, and then dividing these into smaller pieces suited for hoops, as has been the common practice heretofore; and the special object in view is to so improve this class of hoop-cutting machines that they shall be durable, cheap, and more efficient in the performance of the work required of them than other machines heretofore constructed for a similar purpose; and the invention consists in the especial construction and arrangement of the different parts of the machine, as will be hereinafter fully described, and specifically pointed out in the claims.

In the drawings, Figure 1 is a perspective view of the machine, showing the relative arrangement of its several parts. Fig. 2 is a rear elevation; Fig. 3, an end view; Figs. 4 and 5, vertical cross-sections, looking in opposite directions from the line *x x*, Fig. 2; and Figs. 6 and 7 are enlarged detail views of the screw-center.

A represents the bed of the machine, upon which the superstructure is erected, and which consists in part of the vertical posts or standards B, connected at the top by a cross-piece and carrying the two shafts C and C$^1$, which revolve in suitable journal-boxes attached to the posts. The first of these shafts, C, is provided with the pulley C$^2$, through a belt upon which pulley from any suitable motor power is applied to operate the machine. A spur-gear, *a*, upon the shaft C engages with a similar gear, *a'*, upon the shaft C$^1$, thus giving motion to the latter; and as these gears *a* and *a'* have each an equal number of teeth, the number of revolutions of the shafts in a given time will be equal.

Crank-wheels D and D' are secured upon the ends of the shafts C and C$^1$, the wheel D' being connected by means of its crank-pin and the pitman *b* to the swinging knife-carrier E. This knife-carrier is provided with the bevel-edged knife *c*, secured within a properly-shaped recess formed for its reception in the carrier by suitably-placed screws, and is sustained and forced to follow the desired path during its vibrations by the radial arms *d*, pivoted at one end to the knife-carrier and at the other to the slotted cap F, which is carried upon the vertical frames or standards G and G', attached to the bed A.

The length of the pitman *b* with relation to the knife-carrier is such that, when the crank is at the point nearest to the carrier, the radial arms *d* shall be deflected to their greatest extent from a perpendicular to the carrier, thus causing the latter to reach the highest limit in its stroke, while its lowest limit is reached when the crank is at the opposite point of its throw. The knife-carrier is further guided and prevented from deflection to either side by moving in slots in or upon suitably-arranged slides attached to the standards G and G'. One set of the radial arms *d* may be made slightly longer than the others, so that one end of the knife shall strike the log before the other, thus rendering its action easier and the jar of the machine less.

Another knife-carrier, E', provided with a knife, *c'*, and moving upon guides placed at right angles, or nearly so, to those which control the movements of the carrier E, is reciprocated by the pitman *b'* from the crank-wheel D'. As this knife *c'* is only intended to cut the edge of the hoop from the log, the extent of its forward movement is not necessarily so great as that of the knife *c*, which is intended to cut into the log radially to an extent equal to that of the full width of the hoop. Therefore the knife-carrier E', instead of being carried forward by the action of radial bars, as is the carrier E, may be provided with diagonal slots *e*, through which pass the stationary

guides $c'$, which, by the reciprocation of the carrier E', will give to its attached knife the forward movement required to sever the edge of the hoop, the relation between the position of the spur-gears $a$ and $a'$ and crank-wheels upon the shafts C and C$^1$ being such as to cause the knife $c'$ to advance and make its cut into the log while the knife $c$ is being withdrawn, so that when the latter advances the hoop will readily give to the knife and be separated from the log without the checking which would inevitably occur were the radial cut by the knife $c$ made first. In order to support the log under the action of the cutting-knives it is held firmly between the centers H and H', which are formed with sockets having sharp edges and traversing wings, which enter the ends of the log, holding it firmly and revolving with it.

The spindle of the center H is provided with a screw-thread, which passes through a sleeve in the vertically and horizontally adjustable bearing $g$, so that, by means of the hand-wheel $f$ upon the outer end of the spindle, the centers may be forced into the ends of the log and secured in that position by jam-nut $h$, where they remain firmly embedded during the operation of cutting it into hoops. The bearing which carries the center H is made laterally adjustable by means of a deflecting-screw, which enables the operator to place the log in such a position that the vertical knife shall cut with the grain of the wood. Both centers, as before stated, revolve freely in adjustable bearings, which move as the log is cut away, so as to keep it always in the proper position with relation to the cutting-knives. This movement is accomplished by providing the center H with a spur-gear, $i$, which, as the center revolves, engages with a rack, $k$, upon the wedge J, moving in suitable guides upon the bed A. It will be evident that as the center H revolves the wedge will be drawn under it, thus forcing it up nearer to the cutters, and, of course, carrying the log with it. Instead of the spur-gear $i$, as upon the center H, a bevel-gear, $i'$, engaging with a similar gear upon the screw $l$, may be used in connection with the center H', the rotation of this center, through the agency of the bevel-gears, turning the screw, and causing the center to be elevated. This center H' is also provided with a squared end to allow of the application of a wrench or crank, by which it may be turned when it is desired to raise or lower the log by hand. It will be apparent that the screw and bevel-gears might be applied to the raising and lowering of the center H, if desired, with but slight change in the general construction of the machine.

In order to feed the log to the cutters a bevel-gear, $m$, is secured upon the shaft C, and engages with a similar gear upon one end of the shaft L, revolving in bearings $d'$, attached to the frame of the machine. Upon the opposite end of this shaft from its driving-gear is placed the cam $n$, which, as the shaft L rotates, strikes against the spring-supported lever O, one end of which is fulcrumed upon the feed-shaft P, while the other is retained in contact with the cam $n$ by means of the spring $n'$, one end of which is attached to the lever O and the other to the cap F.

Pivoted to the under side of the lever O is a spring-pawl, $r$, which engages with the ratchet-wheel Q upon the feed-shaft. It will therefore be apparent that the revolution of the shaft L will, through the agency of the lever O, its spring-pawl, and the ratchet-wheel Q, give to the feed-shaft P an intermittently-rotating movement, which being communicated to the log by the toothed wheels R, secured upon the feed-shaft, will give to the log a correspondingly intermittent rotation, moving it forward a distance equal to the thickness of a hoop at each rotation of the shaft L; and as this is so geared as to make one revolution at each stroke of the knives, it is evident that the movements of the log will correspond therewith, so as to present a new section thereof to the action of the knives at every stroke. This feed-shaft P has a free vertical movement, being restrained laterally in one direction by the standards or frames G and G', and in the other by the bars $s$, the ends of which are secured in the frames. The weight of the feed-shaft and its appliances presses the teeth of the feed-wheels into the log sufficiently to give the two a corresponding forward motion without slip; and to prevent the feed-shaft from reacting when the feed-pawl is drawn back, the ratchets T are secured upon it in such a manner as to be acted upon by the differential pawls $w$, thus preventing all reaction by catching the teeth of the ratchets T in their slightest forward movement.

In order to prevent the momentum acquired by a heavy log when the machine is working rapidly from carrying it too far, thus increasing the thickness of a hoop beyond what is necessary, a brake or presser, U, is attached to the cap F or other suitable part of the frame, and actuated by a spring or other means, so that it can be applied to the surface of the log whenever its services are required to keep the log from feeding too fast. Another use of this device is that when the log is small, and the vertical knife cuts into it a little below the edge of the horizontal knife, it has a tendency to lift the log, and if the horizontal knife fails to cut deep enough there will be the same tendency to lift, which may be prevented by this device.

The operation of the machine is as follows: A log of wood having the length of the proposed hoops is thoroughly softened by steam (the center of each end marked so that it can be readily adjusted when in the machine,) and placed between the centers, which are then screwed up until they are embedded in the ends of the log. Power is then applied to the driving-pulley and the machine set in motion. The log begins to rotate and the knives to act upon its periphery, the first cuttings being, of

course, useless; but as the operation proceeds, the line of cut of the edge-cutting knife being that of a spiral line drawn from the periphery to the center of the log, with sufficient space between the convolutions to give the width of a hoop, perfect hoops of full width are soon formed and continue to be produced until only a core of little greater diameter than the centers is left. This is then removed and another log takes its place. The hoops as cut fall forward upon the carrier of the edge-cutting knife, or upon an apron prepared for the purpose, from which they are removed by an attendant.

Among the advantages secured by the construction and arrangement of the several parts of the machine as hereinbefore described may be named the following: First, the mechanism which raises the log to the knife is operated by the rotation of the log with the centers upon which it is sustained; therefore, should the log, when fixed between the centers, be too low for the action of the knives, it may be raised by applying a crank or wrench to one of the centers, preferably that sustained by the screw; secondly, the improved feed movement, consisting of the finely-toothed feed-wheels, which readily bite into the log, and are so placed near the ends of the feed-shaft as to give room between them for the operating cam and lever, thus balancing the strain upon the feed-shaft and causing it to work steadily, while the ratchets and differential pawls at each end prevent any reaction; thirdly, the arrangement of the radial arms which carry the vertically-cutting knife in such a manner that one end of the knife shall strike the log before the other, thus relieving the machine from the strain and jar caused by the entrance of the knife into the log simultaneously from end to end; fourthly, the arrangement of the deflecting-screw, by which one of the centers may be carried to one side of the line of the vertical knife, so as to bring the latter into line with the grain of the wood; fifthly, the use of the screw operated by the bevel-gears for the purpose of raising and lowering the log; and, lastly, the arrangement of the mechanism in such a manner that the instant the vertical knife has been raised sufficiently the log is fed forward and the horizontal knife makes its cut and retreats as the other is just entering the log, thus allowing it to pass through the wood and remove the hoop without checking it.

I am aware that vibrating knives have been used for cutting paper hung upon pivotal arms, one pair of which was longer than the other, for the purpose of giving to the knife a drawing cut; but such devices I do not claim.

Having thus described my invention, I claim as new, and desire to secure by Letters Patent, the following:

1. In a hoop-cutting machine, the combination of the driving-shaft with the cam-shaft, its cam, the pawl-carrying lever, and feed-shaft, with its actuating-ratchet, as specified.

2. In a hoop-cutting machine of the character described, the combination of the feeding devices with a brake, applied to the periphery of the log to prevent its being lifted by the knife or too rapid advance, as set forth.

3. In a hoop-cutting machine, the feed-shaft provided with toothed feeding-rolls and end ratchets, as shown and described, in combination with the differential spring-pawls, to prevent reaction of the feed-shaft, substantially as and for the purpose specified.

4. In a hoop-cutting machine, a vertically-cutting knife, in combination with the knife-carrier E, the radial arms *d*, one set of the arms being longer than the other, so that in cutting one end of the knife shall enter the log before the other, all arranged and operating in the manner and for the purpose specified.

5. The method hereinbefore described of cutting hoops from a log, by first making the edge cut with a knife, and, secondly, the radial or side cut with the knife, for the purpose of relieving the knife and preventing checking of the hoop, as set forth.

In testimony that I claim the foregoing as my own I hereunto affix my signature in presence of two witnesses.

JOHN B. DOUGHERTY.

Witnesses:
JAMES NAYLOR, Jr.,
WM. D. GALLAGHER.