(No Model.) 3 Sheets—Sheet 1.

T. J. SULLIVAN.

PROCESS OF FORMING STAVES.

No. 516,243. Patented Mar. 13, 1894.

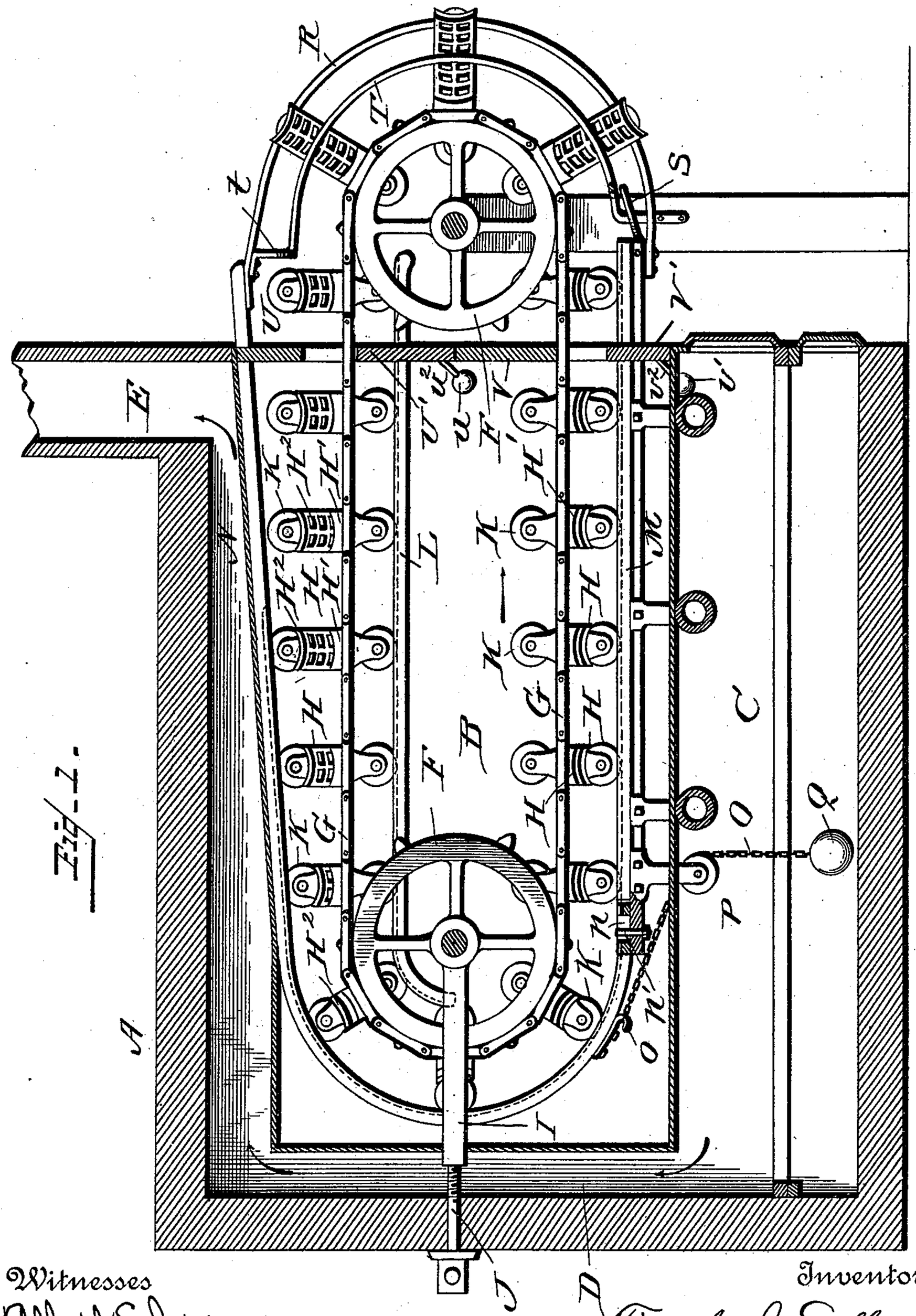

Fig. 1.

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Fig. 2.

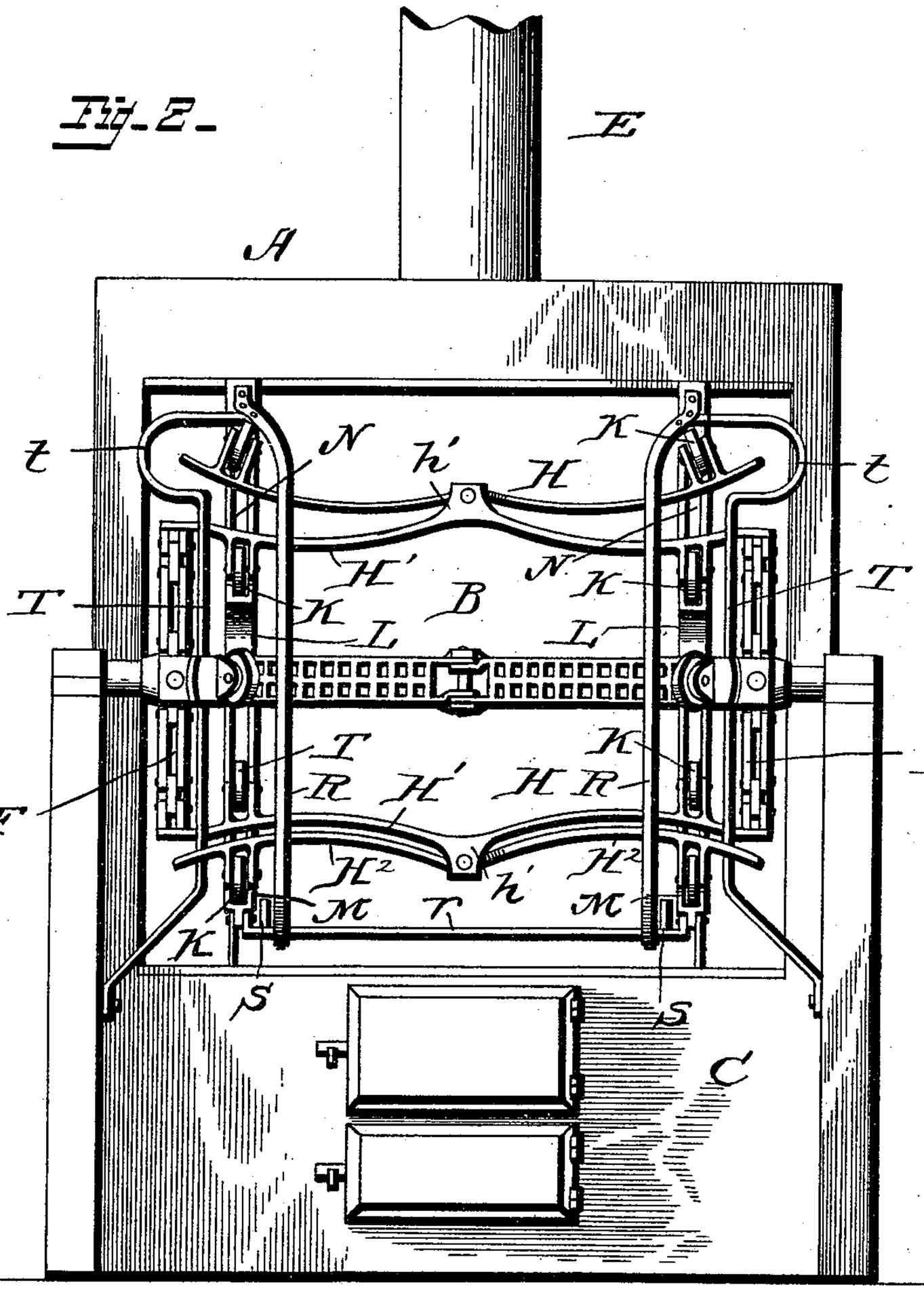

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Fig. 3.

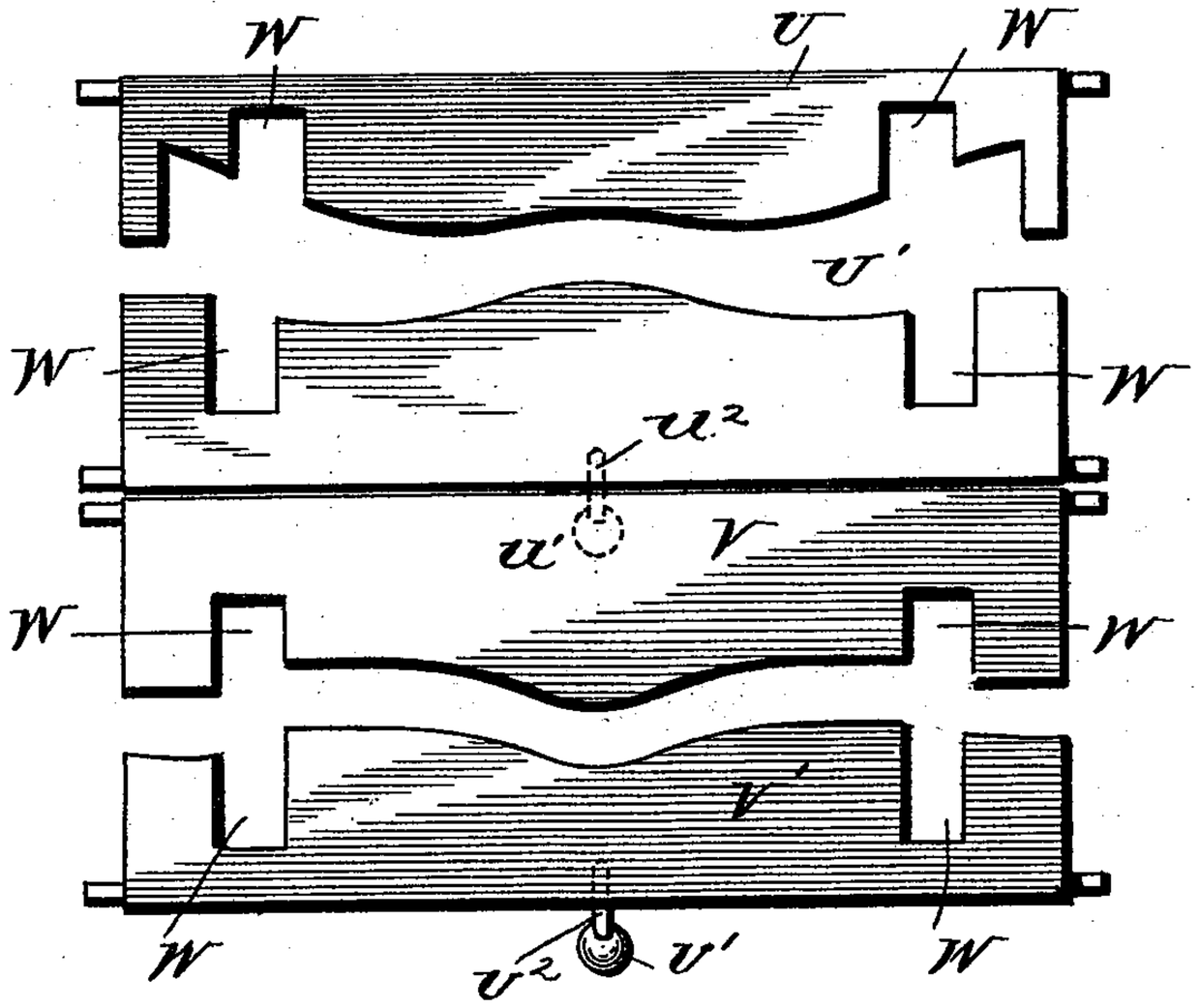
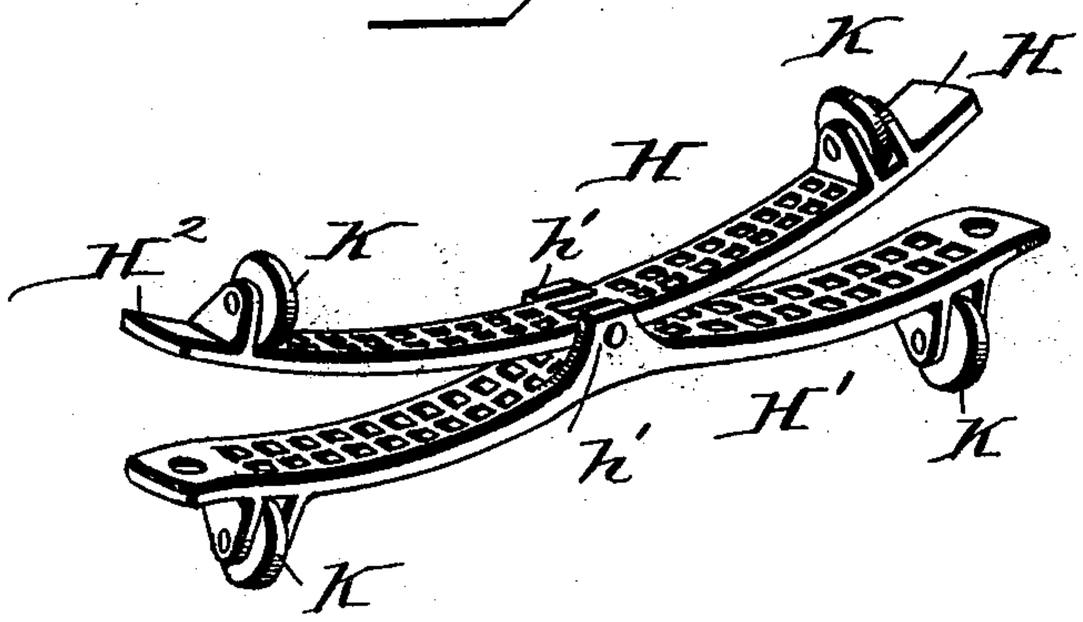


Fig. 4.



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UNITED STATES PATENT OFFICE.

TIMOTHY JAY SULLIVAN, OF NEW ORLEANS, LOUISIANA.

PROCESS OF FORMING STAVES.

SPECIFICATION forming part of Letters Patent No. 516,243, dated March 13, 1894.

Application filed September 15, 1892. Serial No. 445,962. (No specimens.)

To all whom it may concern:

Be it known that I, TIMOTHY JAY SULLIVAN, a citizen of the United States, residing at New Orleans, in the parish of Orleans and State of Louisiana, have invented certain new and useful Improvements in Processes of Forming Staves; 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.

This invention relates to an improved process for forming staves, and it has for its object to provide a simple, inexpensive and rapid process whereby the staves are uniformly shaped and the contour thereof preserved when completed.

To this end, my invention consists, substantially, in subjecting the material from which the staves are to be produced to certain treatment, as will be hereinafter fully set forth, and particularly pointed out in the claims.

Accompanying this specification are drawings illustrating one form of apparatus by which my invention may be carried out, and in which—

Figure 1 is a vertical longitudinal sectional view of an apparatus embodying my invention. Fig. 2 is a forward end view thereof. Fig. 3 is a plan view of the gates. Fig. 4 is a detail perspective view of the stave-former.

Corresponding parts in the figures are denoted by the same letters of reference.

Referring to the drawings, A designates a drying kiln which comprises a longitudinal heating chamber, B, and a furnace, C, located beneath the same. Leading from the rear of the furnace is a smoke flue, D, which passes in rear, and over the top, of the heating chamber, to the forward end of the kiln, where it communicates with a smoke stack, E. By this arrangement the chamber B is heated at the under side by the furnace proper and at the back and top by the smoke and products of combustion passing through the flue D.

Sprocket wheels, F F, are arranged at opposite ends of the heating chamber and carry chains, G G, passing entirely through the latter and provided with stave formers, H. The wheels F at the rear end of the kiln are each carried by a hanger-yoke, I I, which are adjustable by means of screws, J J.

The formers H each consist of a base portion, H′, connected at its ends to the chains G. These base portions are of a double pattern, each side of which conforming in curvature to a completed stave. Centrally from the base portion project two lugs, h' h', between which are pivoted the opposing ends of two lids, H^2 H^2, said lids conforming approximately to each side of the base portion H′. Upon the under side of the base portion and the upper side of each lid, and near the ends thereof, are provided rollers, K K, the rollers of the lids and base portion projecting respectively in opposite directions.

L L designate two parallel, grooved tracks, arranged near the top of the heating chamber and upon which the rollers of the formers proper are adapted to be guided. The tracks L extend from the front end of the heating chamber to near the rear end thereof and the rear ends of said tracks are curved downwardly and terminate at about the vertical center of the heating chamber. At the bottom of the heating chamber, parallel and in vertical alignment with the tracks L, are two grooved tracks, M M, the latter being straight throughout their length and extending from a point slightly in advance of the rear ends of the tracks L to a short distance beyond the front end of the kiln. Arranged above the tracks L are two flat tracks, N N, which are inclined from their outer ends inwardly, said tracks being adapted to be engaged by the rollers of the former lids. Near the rear end of the heating chamber these tracks are then curved downwardly and segmentally, and are connected with the opposing or inner tracks M. The ends of the tracks N which are connected with the tracks M are provided with longitudinally elongated slots, n n, which are engaged by bolts, n' n', rigidly secured to the tracks N. By this means a loose connection is formed between the tracks M and N whereby the latter is capable of limited longitudinal play. To control this movement of the curved portion of the tracks N, tension devices are provided, which consist of chains, O O, which are respectively attached to hooks,

o o, carried by the tracks N near their lower ends. These chains pass over pulleys, P P, arranged in advance of the lower ends of the tracks N, and said chains carry at their free ends weights, Q Q.

R R designate two guide bars which are secured at their lower ends to a cross bar, *r*, the ends of the latter being secured to the tracks M. The rods R project upwardly, parallel with each other, and have their upper ends curved outwardly and secured to the tracks N. These rods are also segmentally curved throughout their length and are designed to receive the lids of the formers when released from the tracks M and support the same in partially open position. To ease the fall of the former lids when released from the tracks M two flat springs, S S, are secured to the cross bar *r* between the guide rods and tracks M, said springs projecting outwardly at a higher elevation than the adjacent portion of the guide rods. Thus, upon leaving the tracks M the former lids fall upon the springs S which yield under the weight of the lid and deposit the latter easily upon the guide rods.

To prevent the lids from closing upon the formers proper when the latter have reached a point directly above the front chain wheels, and also to prevent accident to the hands of the operator while placing the staves in the formers, two guide rods, T T, are provided. The central portions of the latter are parallel with the adjacent portion of the guide rods R, but are located beyond the same and at a point nearer to the front end of the kiln. To permit the lids of the formers to pass between the guide rods R and T, the lower ends of the latter are curved from each other and secured to the supports of the forward chain-wheel shaft. Thus the former lids are received in a partially open position between the guide-rods R and T and retained in such position until they clear the guide rods T, when they then fall upon the stave blanks which have in the meantime been placed within the formers. To permit the former lids to pass the guide-rods T at the proper point, the upper ends of the latter are formed with reversely-projecting, approximately U-shaped bends, *t t*, the extreme, opposing ends of said rods intersecting the guide-rods R and being secured thereto. For closing the apparatus at the forward end, I employ hinged gates, U, U′, V and V′. Each pair of gates are curved at their opposing edges to conform to the shape of the stave formers, said gates being provided at their opposing edges and near their ends with notches, W, for the passage of the former-rollers. The gates U′ and V′ are held in position by means of weights, *u′ v′*, carried at the ends of crank arms, u^2 v^2, respectively.

In carrying out my process by means of the form of apparatus above-described, the staves are first cut into the proper size and contour. The flat blanks thus produced are fed to the formers, and are carried by the latter through-out the kiln. From the time the staves are placed in the formers until they reach about the center of the kiln, they are only subjected to the weight of the lids of the formers, thus allowing the staves to become gradually heated, and bent by the weight of the lids. By this means breakage of staves, by subjecting them to great pressure while in a cool state, is avoided. When the staves have reached the rear end of the kiln, and have become sufficiently heated, they are then subjected to the full pressure of the means provided for this purpose as well as to the full heating capacity of the kiln, until they shall have reached the outer end of the kiln. In the meantime the staves will have been thoroughly shaped and dried, and are finally automatically discharged from the formers, in condition for use.

It will be noted that, in my improved process, the staves are subjected to a continuously-increasing pressure as they are carried by a continuous movement through a heated chamber under the action of increasing heat, the greatest pressure being applied when the staves are heated to the maximum degree.

By my improved process, the staves produced are of uniform size and contour, an important desideratum in the art, and being thoroughly dried and seasoned retain their shape until used.

I do not wish to be understood as limiting myself to the means herein described for carrying out my improved process, as any other form of apparatus or devices capable of effecting the steps comprised therein may be employed. It will also be understood that I do not herein claim the apparatus, the same forming the subject-matter of a separate application, filed September 15, 1892, Serial No. 445,961. It will furthermore be apparent that the process herein described is applicable to the forming and drying of articles other than staves, such as wooden butter dishes and similar wooden-ware, and I therefore reserve the right to the employment of the process for this and all other purposes for which it is adapted.

I claim as my invention—

1. An improved method or process for forming staves, &c., consisting in first inclosing the same within formers and subjected only to the weight of the lids of the latter, then subjecting the staves to an increasing degree of heat by a continuous movement of the formers, and finally when heated binding them under pressure within the formers.

2. An improved method or process for forming staves, &c., consisting in first inclosing the same within formers and subjected only to the weight of the lids of the latter, then subjecting the staves to an increasing degree of heat by a continuous movement of the formers, and finally when heated binding them under pressure within the formers, the greatest pressure being applied when the staves are heated to the maximum degree.

3. An improved method or process for forming staves, &c., consisting in first curving the blanks by binding the same under continuously-increasing pressure within individual formers, subjecting the blanks to the action of an increasing degree of heat, and then drying the stave while thus bound by subjecting the same to the action of heat, during a continuous movement of the formers, substantially as set forth.

4. An improved method or process for forming staves, &c., consisting in curving the blanks by binding the same under continuously-increasing pressure within individual formers, subjecting the blanks to the action of an increasing degree of heat, and then drying the staves while thus bound, the staves being carried by the formers during a continuous movement through a heated chamber, substantially as set forth.

5. The herein described method or process for forming staves, &c., consisting in placing the blanks in formers and subjecting them to a continuously-increasing pressure and to the action of an increasing degree of heat as they are carried by the formers through a continuous movement in a heated chamber, substantially as set forth.

6. The herein described method or process for forming staves, &c., consisting in placing the blanks in formers and subjecting them to a continuously-increasing pressure and to the action of an increasing degree of heat as they are carried by the formers through a continuous movement in a heated chamber, the greatest pressure being applied when the staves are heated to the maximum degree.

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

TIMOTHY JAY SULLIVAN.

Witnesses:
ALBERT L. MARSHALL,
BERTIE AGNES WOOD.