

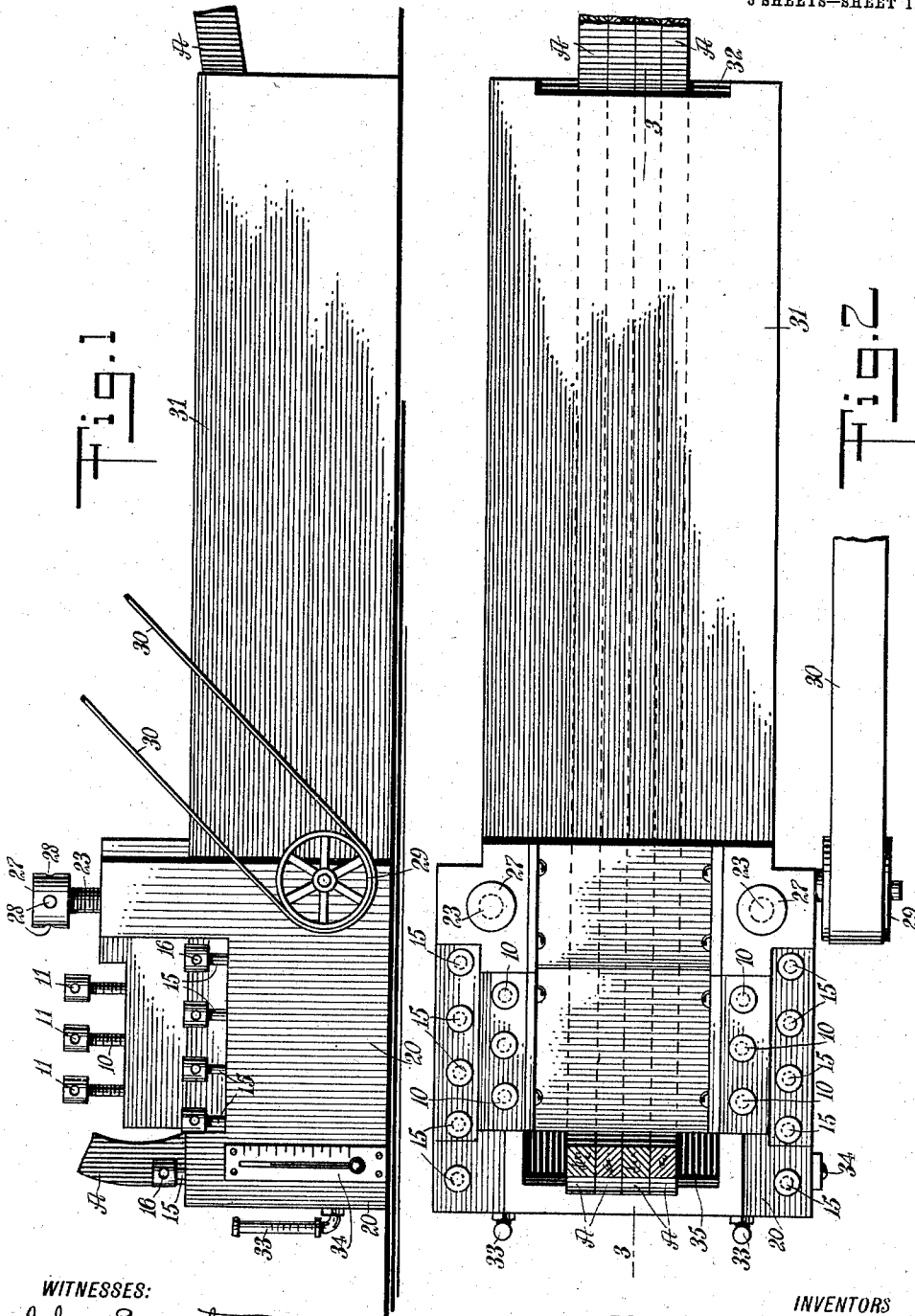
M. S. E. ANDUAGA & H. BOURRELLY.
WOOD BENDING AND HARDENING MACHINE.

APPLICATION FILED MAR. 31, 1910.

Patented Aug. 9, 1910.

3 SHEETS—SHEET 1.

966,983.



WITNESSES:

John Bergstrom
E. J. McDowell

INVENTORS

Manuel S. Espinosa Anduaga
Henri Bourrelly

BY

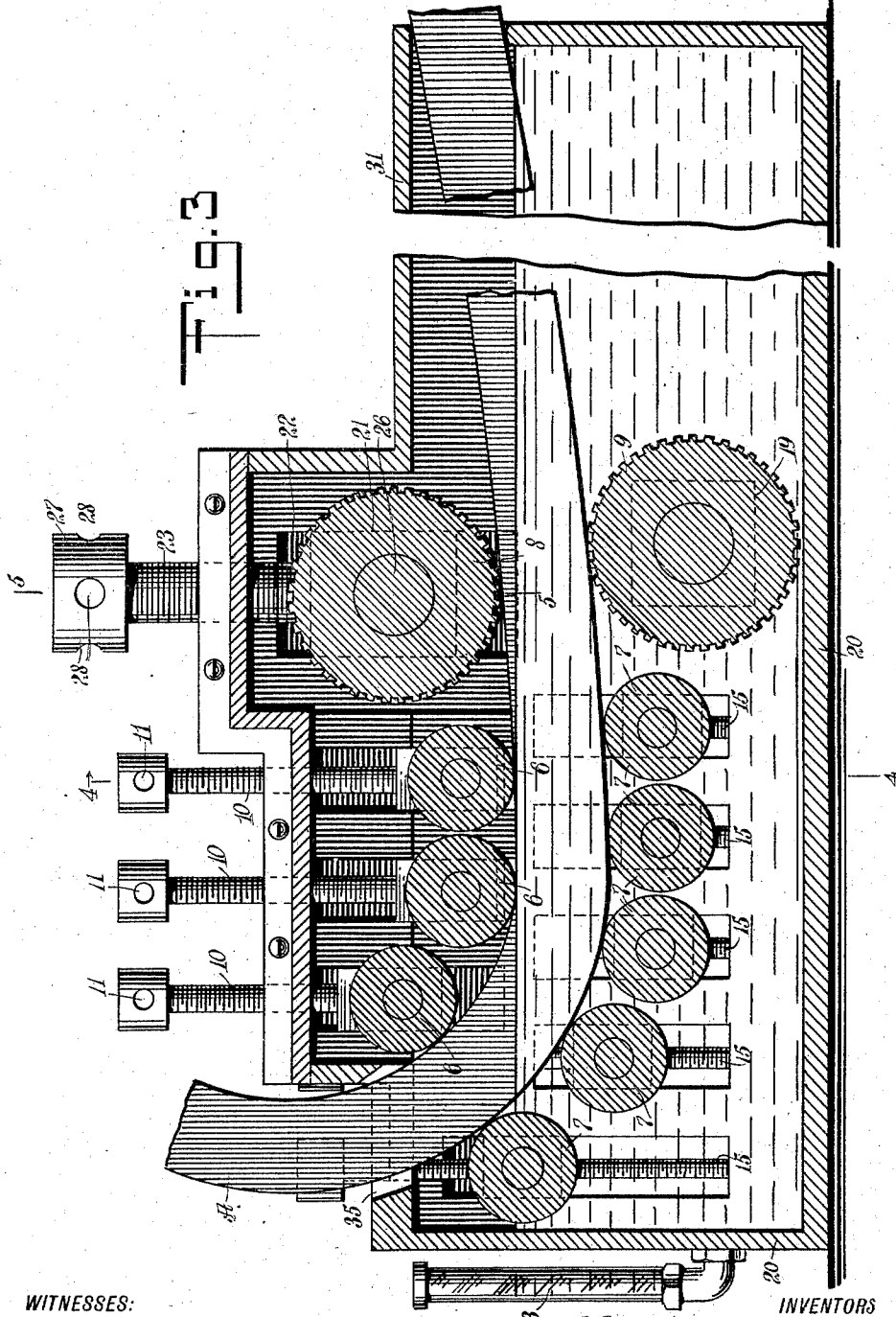
Munn & Co.
ATTORNEYS

M. S. E. ANDUAGA & H. BOURRELLY.
WOOD BENDING AND HARDENING MACHINE.
APPLICATION FILED MAR. 31, 1910.

966,983.

Patented Aug. 9, 1910.

3 SHEETS—SHEET 2.



WITNESSES:

John A. Bergstrom
E. M. M. M. M.

INVENTORS

Manuel S. Espinosa Anduaga
Henri Bourrelly

BY

Mum Co.

ATTORNEYS

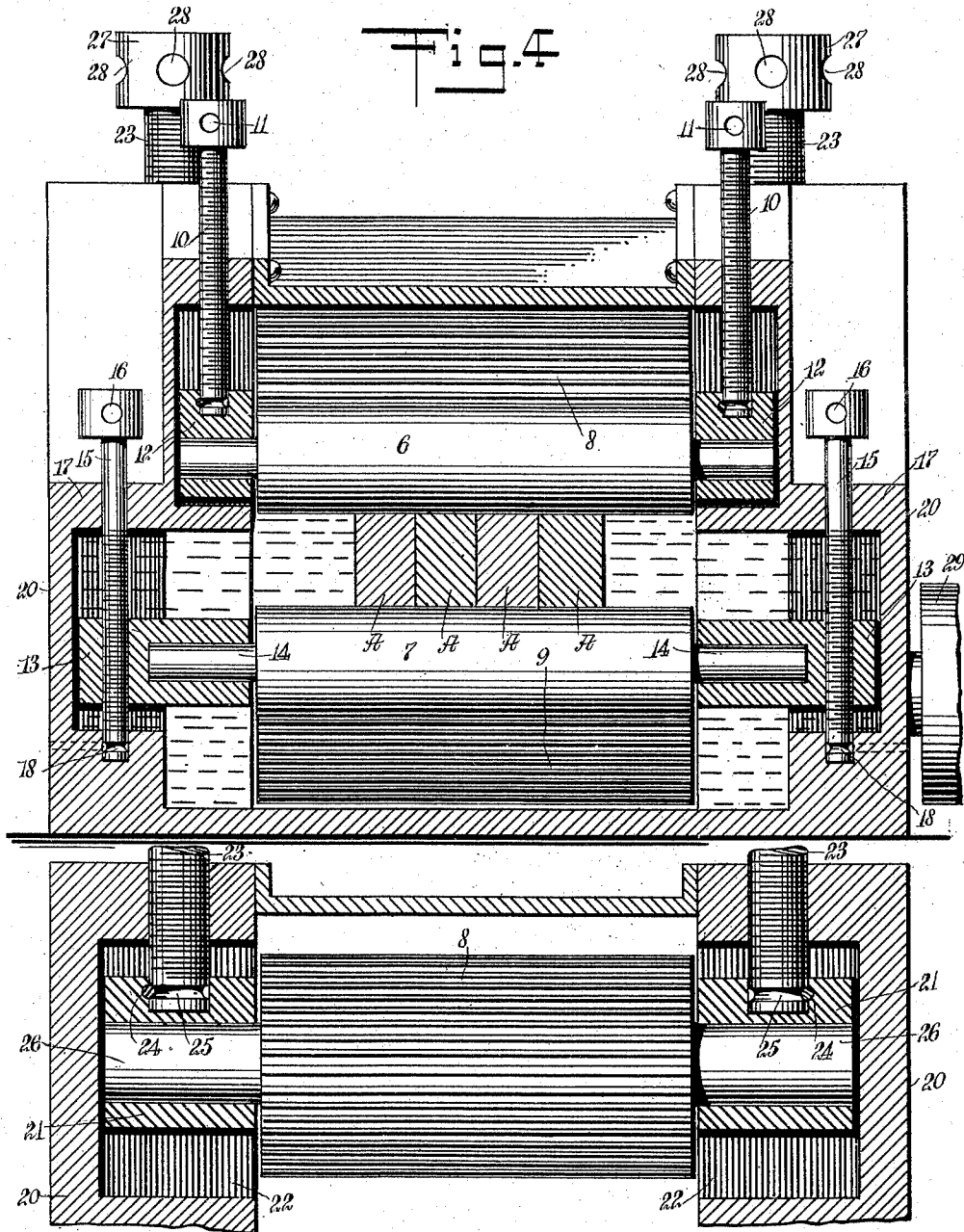
M. S. E. ANDUAGA & H. BOURRELLY.
WOOD BENDING AND HARDENING MACHINE.

APPLICATION FILED MAR. 31, 1910.

966,983.

Patented Aug. 9, 1910.

3 SHEETS—SHEET 3.



WITNESSES:

John Beuphon
C. M. Mudock

Fig. 5

INVENTORS
Manuel S. Espinosa Anduaga
Henri Bourrelly
BY *Manuel Co.*
ATTORNEYS

UNITED STATES PATENT OFFICE.

MANUEL S. ESPINOSA ANDUAGA AND HENRI BOURRELLY, OF LIMA, PERU.

WOOD BENDING AND HARDENING MACHINE.

966,983.

Specification of Letters Patent.

Patented Aug. 9, 1910.

Application filed March 31, 1910. Serial No. 552,627.

To all whom it may concern:

Be it known that we, MANUEL S. ESPINOSA ANDUAGA and HENRI BOURRELLY, citizens, respectively, of the Republics of Peru and France, and residents of Lima, Peru, South America, have invented a new and Improved Wood Bending and Hardening Machine, of which the following is a full, clear, and exact description.

Among the principal objects which the present invention has in view are: to provide a method for bending wood and setting the same in bended shape; to provide a machine for successively and continuously operating to bend and set wood strips singly or in groups; to provide suitable means for feeding wood strips under pressure between rollers disposed to gradually bend the strips to a desired curvature; and to provide a durable, powerful and efficient construction for a machine of the character specified.

One embodiment of the present invention is disclosed in the structure illustrated in the accompanying drawings, in which like characters of reference denote corresponding parts in all the views, and in which—

Figure 1 is a side elevation of a machine constructed in accordance with the present invention, illustrated in conjunction with a wood strip being treated; Fig. 2 is a plan view of the same; Fig. 3 is a longitudinal vertical section on enlarged scale and in diagrammatic form, taken on the line 3—3 in Fig. 2; Fig. 4 is a vertical cross section of the construction illustrated in Fig. 3, taken on the line 4—4 in said figure, and Fig. 5 is a detail view in vertical cross section taken on the line 5—5 in Fig. 3.

It is well known that heretofore wood timbers have been shaped, bent and formed in steam chambers and in heated water baths, either clear or holding in solution some suitable salt. The timbers have been held in forms or frames in stationary position in the said baths until they have become set. Among the objections urged against the process and mechanism, has been the fact that considerable time is consumed in permitting the timbers to remain in the bath, and the further objection that the machines necessary for the handling of the product have been large and expensive.

It is the purpose of the present invention to overcome the objections above mentioned, which is herein accomplished by introducing

the wood timbers A between two series of rollers 6, 6 and 7, 7. The timber is forced between the two series of rollers 6, 6 and 7, 7 by heavy corrugated feed rollers 8 and 9. The rollers 6, 6 are journaled in bearing boxes 12, 12, pivotally connected at the lower end of pressure screws 10, 10. The heads of the screws 10, 10 are provided with perforations 11, 11 adapted to receive a winch bar for turning the said screws. The rollers 7, 7 are mounted in bearing boxes 13, 13, the forward ends of which are provided with bearings for trunnions 14, 14 of the said rollers, while the outer ends are perforated and adapted to receive the threaded portion of screws 15, 15. The screws 15, 15 are provided with head blocks having perforations 16, 16 similar to the perforations 11, 11 to receive the same winch bar or lever used for setting up the screws 10, 10. In this position the rollers 7, 7 are so arranged that the first two rollers 6, 6 of the bending series are disposed in vertical line passing between the adjacent spaces between the first three of the rollers 7, 7. The third of the series 6, 6 is disposed on a radial line between the last two of the series 7, 7. The disposition of the two series of rollers wherein the rollers of the upper series are disposed to exert a pressure between the rollers of the lower series, results in a better gripping action on the part of the said rollers on the interposed wood. The casing in which the said rollers are mounted is provided with an upper and a lower chamber to provide horizontal upper walls 17, 17, through which the screws 15, 15 are extended, and are rotatively mounted therein. The screws 15, 15 are secured in the bed plate of the machine by a groove 18 formed in the said screw to receive a tapered pin driven from the outer wall of the casing to impinge the said groove tangentially. The same form of connection between the screws 10, 10 and the bearing blocks 12, 12 exists. (See Fig. 4 of the drawings.)

In front of the series of rollers 6, 6 and 7, 7 are mounted the rollers 8 and 9. The surfaces of the said rollers are corrugated, as shown in Fig. 3 of the drawings. The corrugations are so formed that the crowns of the teeth thereof are embedded slightly in the surface of the wood when being treated. The rollers 8 and 9 are of equal width but of a larger diameter than the rollers 6 and 7.

The roller 9 is mounted in bearing blocks 19, 19 fixedly mounted in the side of the casing 20. The blocks 19 are so arranged that the center of the roller 9 is, in a vertical
 5 plane advanced somewhat in front of the center of the roller 8. The roller 8 is mounted in bearing blocks 21, 21, which are slidably mounted in recesses 22, 22 formed in the upper side of the casing 20. Pivottally
 10 connected with the blocks 21, 21 are pressure screws 23, 23, the pivotal connection between the said blocks and screws being formed by a pin 24 driven through a perforation formed in the said blocks and passing tangentially
 15 through an annular groove 25 formed in the lower end of each of the said screws. A circular recess is formed in the upper body of the said blocks 21, 21. The blocks 21, 21 form bearings for trunnions 26, 26 extended from the ends of the roller 8. The pressure screws
 20 23 are provided at the upper end thereof with heavy heads 27, 27, which are perforated at 28, 28 to receive a winch bar whereby the same are turned. The roller 8 is an idler. The roller 9 is the driving member of the machine. The roller 9 is driven by a driving pulley 29 and a bolt 30, the same transmitting from any suitable source of
 25 power.

30 The casing 20 is elongated to form a rearward extension 31. The extension 31 is provided at the end removed from the rollers 6 and 7 with an opening 32 wherein are inserted the timbers A, A. The casing 20 is
 35 so constructed as to contain water therein. In practice, a heating system, located either in or outside of the casing 20, is employed, said system not being shown in the accompanying drawings. The water employed in the present described method of bending is
 40 heated, whether in or outside of the said casing. As above stated, the water employed may be impregnated with a suitable salt, or used in its natural condition. Somewhat dependent upon the heat and the salt employed is the speed with which the roller
 45 9 is driven, and the timbers thereby passed between the bending rollers 6, 6 and 7, 7. Connected with the water space of the casing 20, and extended from the side thereof, is a glass water column gage 33, wherein is
 50 exposed the surface level of the water held in the casing 20. Connected with the water space so as to receive the direct heat thereof, and mounted upon the side of the casing 20,
 55 is a thermometer 34. The said thermometer is used to show the variation in the heat of the water contained in the said casing.

60 To operate the machine illustrated in the accompanying drawings, and to carry out the method of bending herein described, the lower portion of the casing 20 is filled with water, in its natural condition or as a brine, heated to the desired degree. The rollers
 65 6, 6 and 7, 7 are adjusted by turning the

screws 10, 10 and 15, 15, said adjustment being set by a model inserted between the said rollers, or by scales provided. The model referred to may be previously bent or
 70 formed by bending the initial timbers. The timbers A, A are then introduced through the opening 32 in the extension 31 of the casing 20, and advanced therethrough in the path therein provided, until the forward
 75 end impinges upon the roller 9. The roller 9 lifts the impinging end of the timber until the same passes over the top of the said roller. In thus passing over the top of the roller 9 the upper side of the timber is brought in contact with the lower side of
 80 the roller 8. The roller 8 is now adjusted, by means of the winch bar placed in the perforations 28, in such manner as to set the screws 23 down to cause the corrugations of the rollers 8 and 9 to bite into the surface
 85 of the timber therebetween. The continuance of the rotation of the roller 9 now gradually but continuously, advances the timber A. In thus advancing, the end of the timber impinges upon and over-rides the first
 90 of the series of rollers 7. The disposition of the upper surface of the roller 7, the upper surface of the roller 9, and the lower edge of the opening 32 is such as to impose a bending strain upon the said timber. Pro-
 95 gressing over the first of the rollers 7 the end of the timber is next extended under the first of the rollers 6. If the roller 6 be not adjusted to bear upon the said timber, this is corrected by setting down the screw 10 and
 100 the bearing blocks 12, 12 carrying the said roller. The timber is now forced forward, progressively passing between the second roller 7 and the second roller 6, the third roller 7 and the second roller 6, the fourth
 105 roller 7 and the third roller 6, and the fifth roller 7 and the third roller 6. If the rollers are disposed in the position shown in Fig. 3 of the drawings, the result on the timbers A will be that the same are bent as illustrated
 110 in the said figure of the drawings. When the timbers are delivered from the opening 32 in the casing 20, they are carried to suitable drying or setting room to be allowed to naturally set or to be anchored in the de-
 115 sired shape and so held until thoroughly dried.

In Figs. 2 and 4 of the drawings the timbers A, A, being treated, are illustrated as passing through the rollers in clusters. In
 120 the present drawings the cluster is shown as four timbers. It will be understood that any number of timbers may be passed through the machine simultaneously, within the limits of the spread of the rollers 6, 6.
 125

It will be apparent from the foregoing description taken in connection with the drawings, that the wood is not only bent, but is also seasoned and hardened, as it is
 130 passed through the machine.

Having thus described our invention, what we claim as new and desire to secure by Letters Patent is:—

1. A wood bending machine, comprising an elongated chamber containing a suitable liquid; a plurality of opposed guide rollers mounted in said chamber at the delivery end thereof; means for adjusting said rollers to form a curved passage between said rollers; and means for forcing timbers through said passage.

2. A wood bending machine, comprising an elongated chamber containing a suitable liquid; a plurality of guide rollers oppositely disposed at the delivery end of said chamber, certain of said rollers being submerged in said liquid; means for adjusting said rollers to form a curved passage between said rollers; and means for forcing timbers through said passage.

3. A wood bending machine, comprising an elongated chamber containing a suitable liquid; a plurality of guide rollers oppositely disposed at the delivery end of said chamber, certain of said rollers being submerged in said liquid; means for adjusting said rollers to form a curved passage between said rollers; a plurality of feed rollers disposed in front of said guide rollers and having roughened gripping surfaces; and a driving mechanism for rotating said feed rollers to force the timbers through said passage.

4. A wood bending machine, comprising an elongated chamber containing a suitable liquid; a plurality of guide rollers oppositely disposed at the delivery end of said chamber, certain of said rollers being submerged in said liquid; means for adjusting said rollers to form a curved passage between said rollers; a plurality of feed rollers disposed in front of and in line with the

said passage to form an extension thereof, said rollers having longitudinally disposed corrugations formed in their outer surface; and a driving mechanism embodying one of said rollers for forcing the said timbers through the said passage.

5. A wood bending machine, comprising an elongated chamber containing a suitable liquid; a plurality of guide rollers oppositely disposed at the delivery end of said chamber, certain of said rollers being submerged in said liquid; a plurality of vertically adjusted bearing boxes for said guide rollers; a plurality of feeding screws movably engaging said boxes and adapted to adjust the same to form a curved passage between said rollers; a plurality of feed rollers disposed in front of said guide rollers and having roughened gripping surfaces; and a driving mechanism for rotating said feed rollers to force the timbers through passage.

6. A wood bending machine, comprising an elongated receiving chamber containing a suitable liquid and having an inlet passage at the end thereof; a plurality of guide rollers oppositely disposed at the delivery end of said chamber, certain of said rollers being submerged in said liquid; a plurality of feed rollers disposed in front of said guide rollers and having roughened gripping surfaces; and a driving mechanism for rotating said feed rollers to force the timbers through said passage.

In testimony whereof we have signed this specification in the presence of two subscribing witnesses.

MANUEL S. ESPINOSA ANDUAGA.
HENRI BOURRELLY.

Witnesses:

SAMUEL NÁLCON,
CARLOS SÁNCHEZ.