(No Model.)

H. L. DU BOIS.

MACHINE FOR COMPRESSING AND CURING TIMBER.

No. 514,847. Patented Feb. 13, 1894.

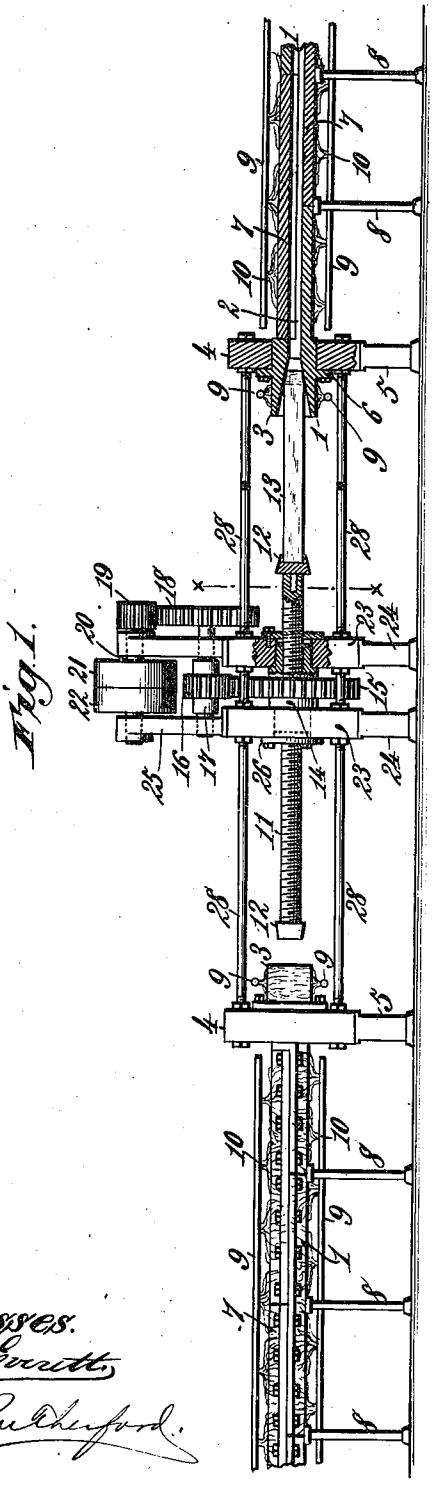

Fig. 1.

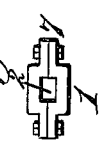

Fig. 6.

Fig. 5.

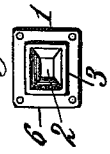

Fig. 4.

Fig. 3.

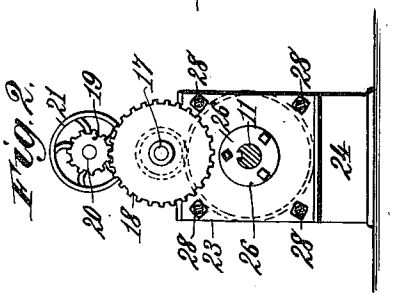

Fig. 2.

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UNITED STATES PATENT OFFICE.

HENRY L. DU BOIS, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR OF SEVEN-SIXTEENTHS TO M. H. HARRINGTON AND ROBERT BOONE, OF SAME PLACE.

MACHINE FOR COMPRESSING AND CURING TIMBER.

SPECIFICATION forming part of Letters Patent No. 514,847, dated February 13, 1894.

Application filed August 25, 1892. Serial No. 444,131. (No model.)

To all whom it may concern:

Be it known that I, HENRY L. DU BOIS, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented new and useful Improvements in Methods of and Machines for Compressing and Curing Timber, of which the following is a specification.

The object of this invention is to provide a new and improved machine, whereby it is possible to utilize many varieties of timber which under natural conditions would not be suitable for such mechanical purposes as the manufacture of spokes, shuttle blocks, last blocks, ball bats and other articles or structures requiring considerable strength, hardness and durability of material.

Heretofore a very large proportion of forest products has been rejected for use in the arts owing to lack of sufficient density and resisting qualities. The requirements of weight and density are the radical conditions affecting the resisting qualities of wood, and in grading or selecting for quality and suitableness, specific gravity, density, weight, &c., are cardinal points to be noted in estimating the economic value of timber products. By practically and economically condensing the fibrous structure of comparatively poor and light timber and simultaneously removing sap and moisture therefrom, as contemplated by my invention, I am enabled to greatly improve the strength, durability and resistance of such timber and thereby enhance its value in the arts and manufactures.

To this end my invention consists in the features of construction and the combination or arrangement of parts hereinafter described and claimed, reference being made to the accompanying drawings, in which—

Figure 1 is a partly sectional side elevation of a timber-compressing and curing machine constructed according to my invention for increasing the density of timber and driving out sap and moisture therefrom. Fig. 2 is a vertical transverse section of the machine on the line *x x* of Fig. 1. Fig. 3 is a view of a guide for the compression screw. Fig. 4 is an elevation of the inlet end of the compression die. Fig. 5 is a view of a socket carried on the end of the compression screw. Fig. 6 is an elevation of the delivery end of the die.

The machine illustrated in the drawings essentially comprises a die 1, Figs. 1, 4 and 6, through which the timber to be treated is forced while said die is in a highly heated condition. It will be understood, of course, that the opening or chamber 2 which extends through this die will have a contour, diameter and length corresponding to the form and size of the piece of timber to be treated. The inlet end 3 of the die 1 is somewhat enlarged and is preferably supported in a suitable opening formed in a strong metal block or head 4 that may be provided with a foot or other suitable support 5, as shown. A flange or shoulder 6 may be formed on the enlarged end 3 of the die for the passage of bolts by which it can be secured to its support. The inlet end of the die is partly tapered in its interior to facilitate entrance of the timber therein. After being forced through this partly tapered portion 3 of the die 1 the timber is immediately received by a die extension 7 which is preferably integral, in part at least, with the tapered end of the die. This die extension 7 may be of any desired length according to the average length of the pieces of timber to be compressed and cured in the machine.

As shown in Figs. 1 and 6 the die extension 7 may be divided longitudinally into upper and lower flanged sections securely connected by means of bolts and nuts or otherwise. For convenience of construction one of these sections may be integral with the tapered portion of the die and the other, preferably the top section, separate therefrom. The upper and lower sections of the die extension 7 may be each made in several lengths or pieces preferably arranged to break joints, as shown in Fig. 1. The elongated die extension 7 may be supported on standards 8, or otherwise, in any convenient manner. I prefer to make that portion of the die chamber or passage 2 which is in the die extension 7 about one sixteenth of an inch greater in diameter than the smallest portion of the die inlet.

The tapered portion or inlet end 3 of the die and the die extension 7 are arranged to be heated by any suitable means. For this purpose a series of gas pipes 9 arranged in proximity to the several parts of the die and provided with Bunsen gas jets or burners 10 may be conveniently employed. Natural gas or other burning fluid may be used. The temperature should be from 400° to 600° Fahrenheit and the heat should be applied to the die and die extension in such a manner as to provide a continuous highly heated passage for the compression and curing of the timber.

In order to force a block or stick of timber into and through the highly heated die I prefer to employ a screw 11 having secured to one end a socket 12 Figs. 1 and 5 adapted to receive and support one end of the piece of timber 13 as shown in Fig. 1. This socket 12 will be cored or recessed to conform to the cross-section of the timber and its exterior will be tapered or beveled to correspond with the taper in the inlet end of the die, the said tapered socket 12 being thus adapted to enter the tapered end 3 of the die and support the end of the piece of timber until it passes beyond a point where it could expand or escape from compression. This tapered socket fitting around and supporting the end of the piece of timber also serves to prevent the end of the timber from being upset or bulged out under the pressure exerted by the screw.

For the purpose of moving the screw 11 longitudinally it is conveniently supported in a nut 14, Fig. 1, to which is secured a spur gear 15 driven by a pinion 16 on a shaft 17 having attached to one end a spur gear 18 that in turn is driven by a pinion 19 on a shaft 20 on which a fast pulley 21 and loose pulley 22 are mounted. The nut 14 may be journaled at its opposite ends in strong metal blocks or heads 23, Figs. 1 and 2, that are supported on feet or standards 24 and provided at the top with supports 25 in which the shafts 17 and 20 are journaled. To each head 23 may be securely bolted a centrally perforated guide disk 26, Figs. 1, 2 and 3, adapted to surround the screw 11 and provided with a feather or guide lug 27 engaged in a longitudinal groove formed in said screw so as to prevent it from turning and cause it to move longitudinally, but without rotation, when actuated by the nut.

As shown in Fig. 1, the machine is preferably provided with two oppositely arranged dies, each having suitable heating appliances, and with a compression screw supported intermediate said dies and carrying a tapered socket on each end. It is obvious that when the screw 11 is moved longitudinally in one direction to force a stick of timber through one of the dies the socket 12 on the other end of the screw will be disengaged from the adjacent die and moved into position to permit the insertion of another piece of timber, so that by alternately moving the screw back and forth and causing it to operate in connection with two oppositely placed dies the capacity of the machine will be doubled and a stick of compressed and cured timber will be alternately delivered from the opposite ends of the machine as long as the material is properly supplied.

For the purpose of securely bracing the machine the several metal heads 4 and 23 may be connected by tie rods 28, as shown in Figs. 1 and 2.

The timber may be taken in either a dry or green condition and after being cut or dressed to suitable dimensions may be at once placed in the machine. One end of the piece of timber is inserted in the tapered end of the heated die and the other end is held in the socket carried by the compression screw 11 which is then put in motion to force the timber into and through said die. In passing through the heated metal die the timber is reduced in bulk, sap and moisture are removed, and the fibrous structure is condensed or solidified without injury to the fibers and with the effect of obviating any liability to cracking, checking or other damage when the cured timber is employed for the various uses to which it may be applied. The effect upon the surface of the timber in forcing it through the heated metal die and die extension is to close the pores and render the grain firm, smooth and dense. The entire substance of the timber is made uniformly compact and close grained, without any liability of crushing or otherwise injuriously affecting its fibrous structure, and the quality of the timber is greatly improved for the various requirements of the manufacturing arts. Each piece of timber forced into the die will drive before it any timber that may be already in the die and if any material remains in the die when the operation of the machine is discontinued it can be readily removed by detaching and raising the upper section of the die extension.

What I claim as my invention is—

1. In a machine for compressing and curing timber to increase its density and drive out sap and moisture, the combination with a compression die and means for heating said die to a high temperature, of a non-rotary longitudinally movable screw adapted to support a stick of timber at one end and to force it into and through the heated die, and mechanism for imparting a longitudinal non-rotary movement to said screw, substantially as described.

2. In a machine for compressing and curing timber to increase its density and drive out sap and moisture, the combination of a compression die comprising a tapered inlet portion and a die extension, means for heating said die and die extension, a non-rotary longitudinally movable screw adapted to force a stick of timber into and through the die and

provided at its end with a tapered socket to receive and support one end of the piece of timber and to enter with it into the tapered inlet end of the die, a nut to actuate the non-rotary screw in a longitudinal direction, and gearing to rotate said nut, substantially as described.

In testimony whereof I have hereunto set my hand and affixed my seal in presence of two subscribing witnesses.

HENRY L. DU BOIS. [L. S.]

Witnesses:

HOWARD M. NORRIS,

JAMES L. NORRIS.