Nov. 15, 1927. 1,649,049

F. H. WILLIAMS

WOOD SCREW

Filed May 9, 1921

Fig. 1.

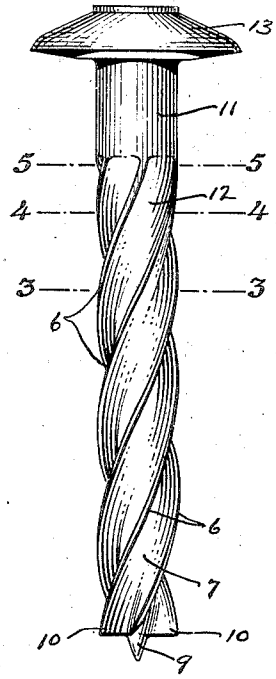


Fig. 2.

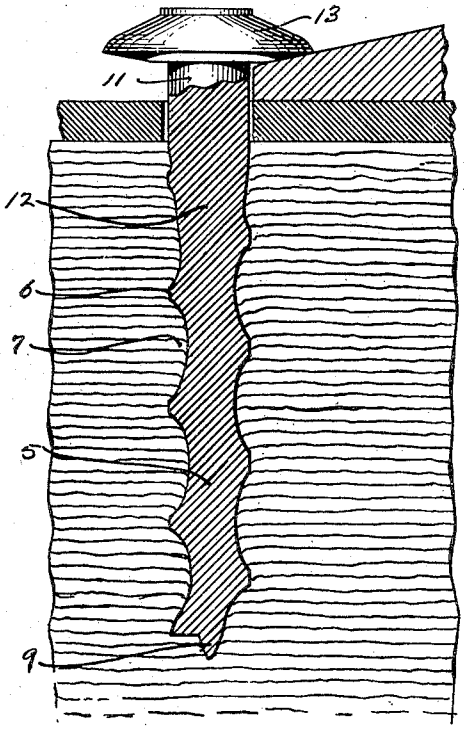


Fig. 4.

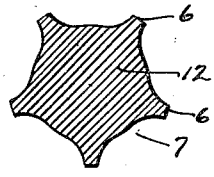


Fig. 3.

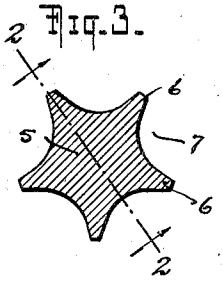
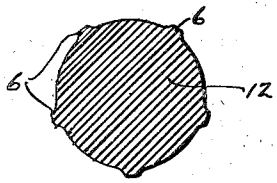


Fig. 5.



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UNITED STATES PATENT OFFICE.

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WOOD SCREW.

Application filed May 9, 1921. Serial No. 467,806.

My invention relates generally to screws and more particularly to screws which are designed to be driven into solid wood.

For convenience, I have illustrated and described my invention as applied to railroad spikes, but it is to be understood that it relates generally to all types of screws having the characteristic above stated.

It is well known to those skilled in the art that, when larger than a certain critical size, a square, straight spike has an increased pull and increased life of holding power, when it is driven into a properly proportioned and previously drilled hole instead of being forced directly into the solid wood. The cause for this is the fact that the wood fibers are deformed within, or not greatly in excess of, their elastic limit. The spike is, therefore, held within the wood by live fibers instead of by dead ones, formerly produced by driving a spike into the solid wood. As is well known, this latter method crushes, beyond their elastic limit, and breaks the fibers and thereby greatly reduces the pull and holding power of the spike.

The chief object of my invention has been to provide a screw of such formation that it may be driven into solid wood without materially splitting or crushing the wood or distorting the fibers beyond their elastic limits, while maintaining the desired resistance to withdrawal.

With this in mind, I have provided a screw which is so formed that it causes only a comparatively small displacement of the fibers of the wood into which it is driven.

My screw also presents a large surface area in contact with the wood, thus increasing its resistance to pulls and substantially maintaining such resistance during the full life of the wood into which it is driven. This resistance is still further increased by the spiral disposition of this surface area.

While preserving the foregoing characteristics and advantages of my screw, I have so formed it that it has a gradual or concurrent increase of transverse strength from a point, where the transverse strain on it is at a minimum up to a point at or near the surface of the wood when this transverse strain reaches its maximum.

The above objects and advantages have been accomplished by the device shown in the accompanying drawings, of which:

Fig. 1 is a side elevation of a complete spike embodying my invention.

Fig. 2 is a longitudinal, sectional elevation of the spike, showing it driven into a cross-tie, and is taken on line 2—2 of Fig. 3.

Fig. 3 is an enlarged, transverse, sectional view of the spike taken on line 3—3 of Fig. 1.

Fig. 4 is a similar view on line 4—4 of Fig. 1.

Fig. 5 is a similar view on line 5—5 of Fig. 1.

The spike comprises a core 5 having a plurality of spirally arranged threads or projections 6, formed by flutes 7. The diameter of the core and the number and shape of the threads are such that when the spike is driven into solid wood it will not materially crush the wood or distort the wood fibers beyond their elastic limits. By the term core, I mean that portion of the spike contained within the cylinder which is tangent to the bottom of the flutes 7. The threads 6 start at a point on the spike which is substantially at or slightly below the surface of the cross-tie, and they terminate near the the bottom of the core 5. The lower ends 10 of the threads are preferably at right-angles to the axis of the spike, and they are slightly sharpened as shown in Fig. 1 so as to present cutting edges. The threads may be of any suitable pitch, it being necessary, however, that the pitch be such that the spike will be rotated by an axial movement as it is being driven into the wood. The flutes 7 at the lower ends of the threads are deepened as shown in Fig. 2.

The core 5 is provided with a conical point 9. This point preferably extends below the lower ends 10 of the threads 6, and it serves to start a hole in the wood into which the spike is driven. The deepened, lower ends of the flutes 7 start at substantially the point where the upper end of the conical point stops. The core 5 is joined to the neck 11 of the spike by means of a tapered portion 12. This tapered portion starts at a point on the core about midway its length, which is where bending resulting from lateral pressure caused by the rail base practically ceases, and it extends upwardly to a point where it merges with the neck 11 at or slightly below the surface of the cross-tie. This insures the spike against breakage from side thrust caused by the pressure of the rail. The out-

side diameter of the threaded portion of the spike is substantially constant throughout its length and the neck 11 is preferably of the same diameter.

In Fig. 2, I have shown the condition of the wood fibers after my spike has been driven into the cross-tie. This is a substantially accurate representation as evidenced by numerous tests which I have made on different kinds of wood. It will be seen that the fibers have not been materially crushed nor distorted to a point beyond their elastic limit. The ends of the fibers where they contact with the surface of the spike are turned down slightly because of the downward movement of the spike when it is driven into the wood. When my spike is withdrawn from the wood, the hole made by it will gradually close, because the fibers have not materially been crushed or distorted beyond their elastic limit. This elastic condition of the live fibers of the wood, causes a greatly increased frictional hold against the outer surface of the spike, thereby greatly increasing its resistance to pull and also increasing the life of the hold. Experiments have demonstrated that my spike may be driven into the same hole a number of times, without substantially affecting its holding power. The core 5 is cylindrical for a greater part of its length, and the threads 6 present a uniform diameter to the outside of the spike. These two features, together with the spiral formation of the threads, result in providing a spike which has not only an increased initial resistance to pull, but which, after the initial pull, also maintains a greater resistance during the first as well as subsequent withdrawals from the wood than any of the prior art spikes. My spike is provided with an umbrella-shaped head 13 which is of cylindrical cross-section so that it always presents portions of the same surface in contact with the rail at any phase of rotation and also serves to protect the hole in the wood against moisture.

The threads 6 may be of any suitable cross-section, pitch or number. These and other modifications of the details herein shown and described may be made without departing from the spirit of my invention, or the scope of the appended claims; and I do not, therefore, wish to be limited to the exact embodiment herein shown and described, the form described being merely a preferred embodiment thereof.

Having thus described my invention, what I claim is:

1. A wood screw formed with a core and a neck, the screw having a substantially uniform outer diameter, a plurality of spirally arranged threads and a plurality of interspaced flutes, the flutes being increased in depth near the lower ends of the threads, and a tapered portion joining the neck portion with the core, the core and the threads being of such a transverse cross-section that they will not materially crush or distort the wood fibers beyond their elastic limits.

2. A wood screw formed with a core and a neck, the screw having a substantially uniform outer diameter, a plurality of spirally arranged threads and a plurality of interspaced flutes, the flutes being increased in depth near the lower ends of the threads, a tapered portion joining the neck portion with the core, and a conical point extending from the lower end of the screw.

3. A wood screw having a substantially uniform outer diameter and being formed with a core, a plurality of spirally arranged threads having their lower ends disposed at right angles to the axis of the screw, a plurality of interspaced flutes, the flutes being increased in depth near the lower ends of the threads, a neck formed at the upper end of the screw, and a tapered portion joining the neck with the core, the core and the threads being of such a transverse cross-section that they will not crush or distort the wood fibers beyond their elastic limits.

4. A wood screw having a substantially uniform outer diameter and being formed with a core, a plurality of spirally arranged threads of uniform pitch, a plurality of interspaced flutes, the flutes being increased in depth near the lower ends of the threads, a neck formed at the upper end of the screw, and a tapered portion joining the neck with the core, the core and the threads being of such a transverse cross-section that they will not crush or distort the wood fibers beyond their elastic limits.

In testimony whereof, I have hereunto signed my name.

FRANK H. WILLIAMS.