H. A. HARVEY.
Wood-Screw.

No. 197,933. Patented Dec. 11, 1877

Figure 1.

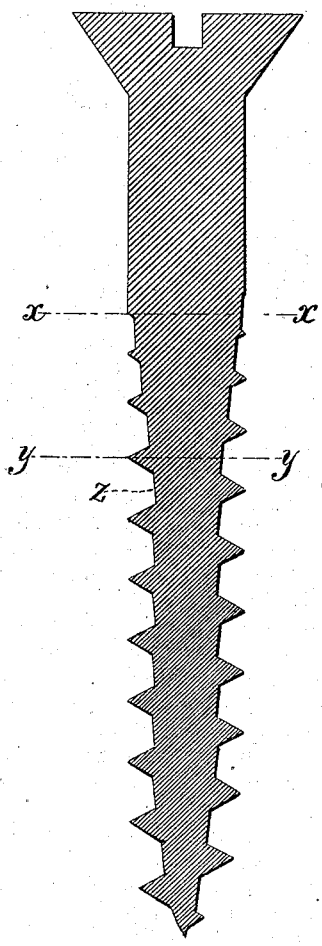


Figure 3.

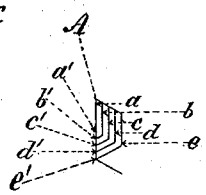
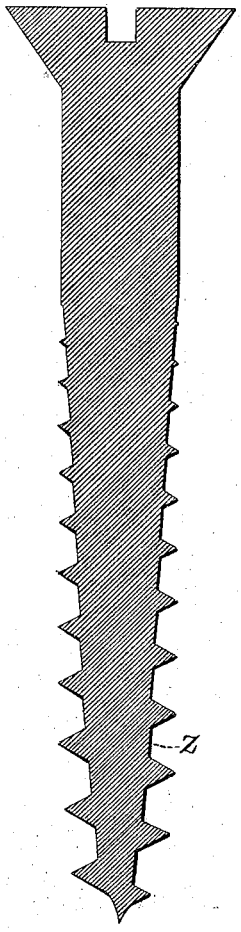


Figure 2.



Witnesses:

Geo. W. Miatt
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UNITED STATES PATENT OFFICE.

HAYWARD A. HARVEY, OF ORANGE, NEW JERSEY.

IMPROVEMENT IN WOOD-SCREWS.

Specification forming part of Letters Patent No. **197,933**, dated December 11, 1877; application filed April 20, 1877.

To all whom it may concern:

Be it known that I, HAYWARD A. HARVEY, of Orange, New Jersey, have invented a certain Improvement in Wood-Screws, of which the following is a specification:

My improvements relate to the formations of threads upon wood-screws.

The chief feature of my invention consists in forming such threads with a differential pitch and a variable depth, the pitch and the depth having a constant relation to each other, due to the fact that the core is of the same length between any two threads, whatever may be the pitch. Owing to this peculiarity I am enabled to cut a thread of differential pitch with a tool having a single fixed lead—in other words, without varying the character of the lead given to the tool in making the series of cuts necessary to finish the thread to the proper depth.

I form my thread with a gradually-increasing pitch from its point of commencement upon the shank of the blank, which, for convenience, I call the "heel" of the thread. I may gradually increase the pitch from the heel to the point of the screw, or increase it for only a portion of the distance and cut the remainder of the thread upon a uniform pitch. The latter mode, especially, I contemplate adopting in the case of very long screws.

The accompanying drawings represent central longitudinal sections of screws exhibiting my invention in the two forms I have mentioned.

Figure 1 shows the differential thread commencing at the heel on the line *x x* and terminating at the line *y y*, from which line the thread has the ordinary uniform pitch to the point of the screw. Fig. 2 shows the differential thread having the pitch gradually increasing from the heel to the point. Fig. 3 is a drawing showing the contour of the threads and exhibiting the relation of the depth to the differential pitch.

It will be seen that all the threads are finished to a sharp edge by the same tool. In cutting the thread the lead of the tool is gradually increased in speed, and at the same time the tool is fed inward toward the axis of the blank.

I determine the character of the motion required to be given to the tool by dividing the greatest depth of the thread into a number of parts corresponding with the number of turns which the differential thread makes. For example, in Fig. 1 the differential thread makes only four turns around the core. To find the motion for the tool in this case, I lay out a single thread, as in Fig. 3, and then draw, at equal distances, four lines, *a b c d*, parallel with the bottom line *e*, which represents the length of the core. I make the lines *a b c d* of the same length as the bottom line *e*, measuring from their respective points of intersection with one of the inclined sides, A, of the thread. Three inclined lines, *b'*, *c'*, and *d'*, are then drawn parallel to the opposite inclined side *e'* of the thread. The distance from the line *b* to the line *a* indicates the depth attained by the thread at one revolution. The distance of the line *b'* from the point *a'* indicates the gain of the lead while the blank is making a single revolution. The distances between the lines *a*, *b*, *c*, *d*, and *e*, respectively, indicate the gain in the depth of thread at each of its revolutions, and the distances between the point *a'* on the line *a* and the respective points where the lines *b'*, *c'*, *d'*, and *e'* intersect the line *a* indicate the increase in pitch at each revolution, or, in other words, indicate the amount of increased lead required to be given to the tool for each of the four successive turns of the blank.

It will be seen that the lines representing the core in Figs. 1 and 2 are inclined to the axis of the screw.

In measuring the depth of the thread preparatory to laying off the pitch of the differential threads, as I have described, I measure on the dotted lines Z, which indicate the average depth of the deepest thread. In Fig. 2 there are twelve turns of the differential thread, and I therefore divide the greatest depth into twelve equal parts.

It will, of course, be seen that the principle of laying out the differential threads as I have described, for the purpose of measuring the pitch, is capable of application for any variety of pitch required.

I claim as my invention—

A screw having a thread which, for any portion of its length, has a differential pitch and a correspondingly variable depth, substantially as described.

H. A. HARVEY.

Witnesses:

ASA FARR,

EDWD. PAYSON.