(No Model.) 2 Sheets—Sheet 1.

A. C. ESTABROOK.

BONE SAWING MACHINE.

No. 260,375. Patented July 4, 1882.

FIG. 1.

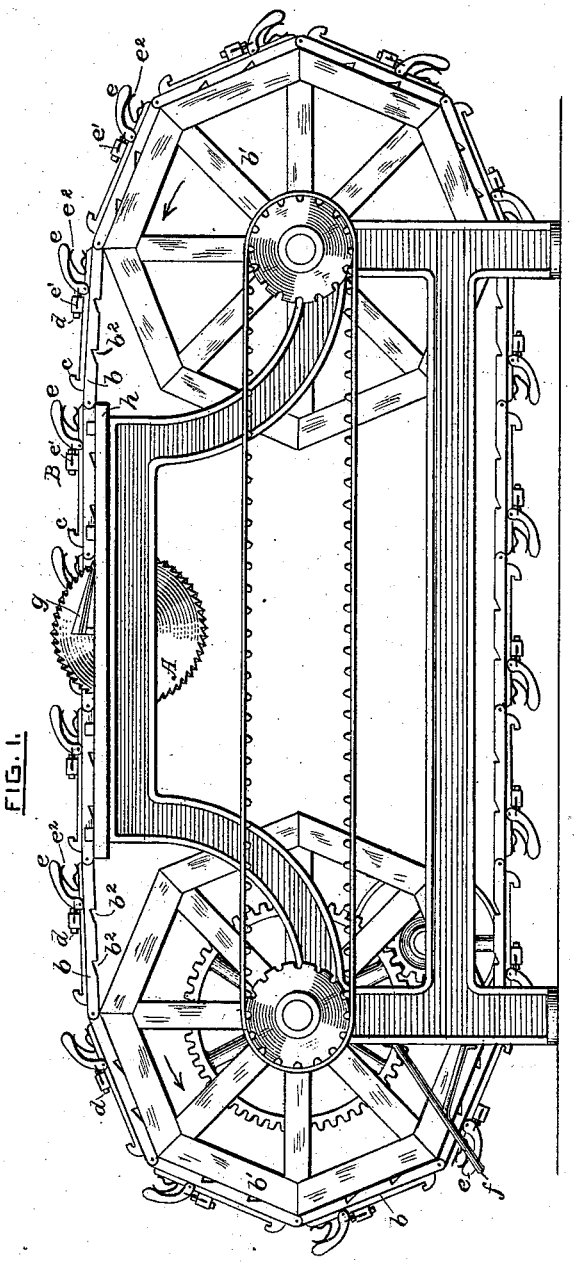
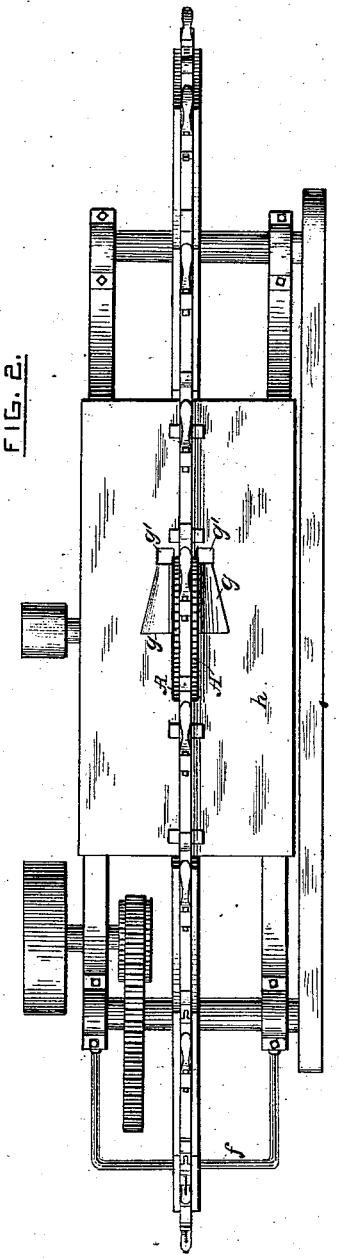


FIG. 2.



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(No Model.) 2 Sheets—Sheet 2.

A. C. ESTABROOK.

BONE SAWING MACHINE.

No. 260,375. Patented July 4, 1882.

FIG. 3.

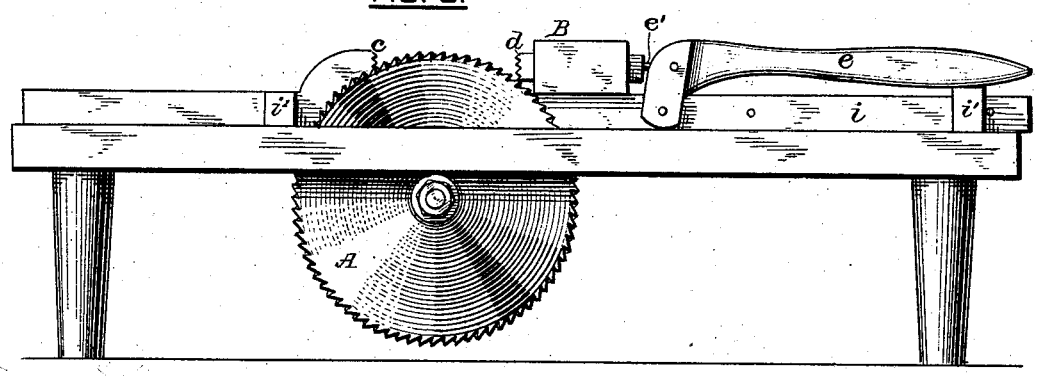


FIG. 4.

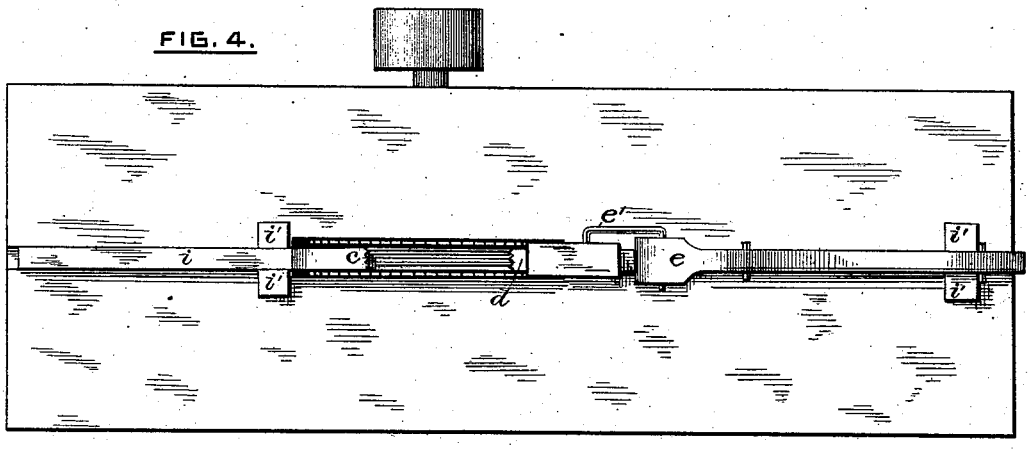
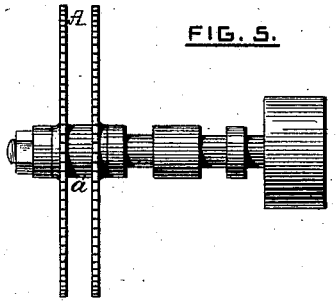


FIG. 5.



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UNITED STATES PATENT OFFICE.

ALANSON C. ESTABROOK, OF FLORENCE, MASSACHUSETTS, ASSIGNOR TO THE FLORENCE MANUFACTURING COMPANY, OF SAME PLACE.

BONE-SAWING MACHINE.

SPECIFICATION forming part of Letters Patent No. 260,375, dated July 4, 1882.

Application filed December 10, 1881. (No model.)

To all whom it may concern:

Be it known that I, ALANSON C. ESTABROOK, of Florence, in the town of Northampton, county of Hampshire, and State of Massachusetts, have invented certain new and useful Improvements in Bone-Sawing Machines; and I do hereby declare that the following specification, taken in connection with the drawings furnished and forming a part of the same, is a clear, true, and complete description of my invention.

My said improvements have been specially devised with reference to working bone in the manufacture of tooth-brush handles. It is well known that the longitudinal sections as cut from a trimmed bone vary in width and in lateral and longitudinal contour, and that their edges are sawed in lines substantially radial in the original bone. Heretofore in this branch of the art of bone-working coarse-set hand-planes have been employed for reducing these sections to a uniform width; but it is practically impossible with the plane to reduce the edges to parallel planes, because of the natural curvatures of the bone and the variations in thickness, which are common to each section, and also common to each edge thereof.

The object of my invention is to obviate the use of the hand-plane and the requisite skilled labor, economically remove extraneous portions, and not only to reduce the bone-sections to a uniform width, but to develop edges which occupy parallel planes, this latter feature being one of great importance when considered with reference to certain subsequent operations involved in the production of tooth-brush handles by machinery.

After a full description of machines as devised and constructed by me, the features deemed novel will be specified in detail in the several claims hereunto annexed.

Referring to the two sheets of drawings, Figure 1, Sheet 1, is a side view of a machine embodying my invention. Fig. 2 is a plan of the same. Fig. 3 is a side view of a simpler machine embodying portions of my invention. Fig. 4 is a plan of the machine, Fig. 3. Fig. 5 is a side view of the saws and their arbor, detached.

The machine illustrated in Figs. 1 and 2 is well adapted to economically perform the service intended, and is in part automatic, so far as relates to the discharge of the bone after it has been sawed.

The saws A are preferably of the circular variety, although reciprocating or jig saws may be employed in lieu thereof, and although the object of the machine is to make longitudinal or splitting cuts in the bone, the saws must have teeth of the cross-cut variety, in order to cut smoothly and to be practically durable. Two saws are employed, exactly parallel, and at such distance apart as will cause them to cut the bone to the width required and leave both edges thereof in truly-parallel planes. They can be variously mounted upon arbors or shafts, but should be capable of adjustment with relation to each other. Each saw (if circular) may be mounted upon a separate arbor and their adjustments effected by means of endwise set-screws carefully centered with relation to the arbors, these being longitudinally movable in their boxes; or, as is preferred, both saws may be mounted upon one arbor, as illustrated in Fig. 5, journaled for its boxes, in which case the saws are spaced by means of a collar, *a*, exactly corresponding in length to the width of cut desired, the adjustment of the saws with relation to each other being effected by means of collars of various lengths, as is common with gang-saws for lumber-working.

The great variation in the longitudinal and lateral contour of sections of bone renders it practically impossible to attain the desired results by sliding the section of bone on a saw-table up to and past a saw, after the ordinary manner of slitting wood with saws, because the bone does not afford the general bed-bearing requisite for that operation, and therefore it is essential either that while the bone be properly held it shall be moved on a carriage up to and past the cutting-edges of the saws or held stationary and the saws moved to and past the bone—as, for instance, with saws mounted at the lower end of a pendent frame—as single saws have heretofore been employed for the cross-cut sawing of boards.

An essential feature in my machine is a clamping device which can securely hold the bone sections during the sawing operation, and this cannot be successfully done, because of

their variable contour by engagement with the inner and outer sides thereof, and, as the edges are to be removed by the sawing operation, the clamp cannot engage therewith. It is also essential that the clamping device be capable of occupying the space between the saws, whether the bone be carried to the saws or the saws moved toward and past the bone. The limited lateral dimensions of the bone when sawed necessarily limit the area of holding-surface, and the irregular contour of the bone limits the holding-surfaces to the two ends thereof. I have therefore devised the clamp B, embodying a base, *b*, a fixed abutment, *c*, a sliding bolt constituting a movable abutment, *d*, and a lever, *e*, linked, as at *e'*, to the movable abutment *d*, for moving it toward and away from the fixed abutment. The engaging-faces of these abutments are sharply serrated, so that they may puncture, and thereby be firmly embedded in the ends of a bone section inserted longitudinally between them, and both abutments are elevated above the upper surface of the bed, so that the bone will not come in contact therewith and prevent its being clamped in a proper position for sawing.

The clamp-base *b* in the machine as organized in Figs. 1 and 2 is one of a series of bases hinged or linked together after the manner of an endless chain and mounted on wheels or drums *b'*, which, when rotated, cause said bases to continuously pass between the saws in one direction, guides therefor, adjacent to the saws, enabling them to accurately maintain their proper position centrally between the saws and to prevent the bone-dust from interfering with their being properly bedded in their guides. Each base has angular recesses b^2 on its under side, one edge of which serves to scrape and keep the bed-guide free from dust.

Beneath the clamping-lever *e* is a strong spring, e^2, which normally maintains the outer end of the lever in an elevated position and the clamp in its closed or engaging position.

At the rear of the machine, and below the axis of the rear drum *b'*, is a stationary rod, *f*, which occupies such a position with relation to the periphery of said drum and the clamps passing over it that when the levers *e* pass said rod the levers, by contact therewith, are forced toward the drum against their springs, thus automatically opening the clamps.

Near the outer side of each saw is an inclined plane or spout, *g*, upon or into which the refuse pieces of bone fall when sawed off, and down which they slide through holes *g'* in the top of the saw-table *h*.

In sawing bone a comparatively slow feed is desirable, and when operated at the highest speed practicable this machine is readily supplied with bone by the operator standing in front of the front drum *b'*. When a clamp arrives at its vertical position on the drum the right hand of the tender is placed upon the lever thereof to open the clamp. The bone held in the left hand is then placed with one end properly against the serrated abutment *d* and the opposite end of the bone in line with the fixed abutment *c*. The lever is then carefully permitted to rise until an engagement is assured between the bone and the fixed abutment, whereupon it is desirable that the lever be forced outward by the hand to obtain a firmer engagement with the bone than the spring alone might be capable of effecting. When attended by an experienced hand each clamp may be thus supplied, and if by one less experienced the clamps may be alternately employed. The automatic discharge of the bone from the clamps enables the tender to devote exclusive attention to filling the clamps, but the machine may be profitably operated if the clamps are wholly worked by hand.

In Figs. 3 and 4 a much simpler machine is shown, having a lesser capacity than the more complex machine already described. It embodies saws A, as before described, and a clamp composed of a base, raised abutments, and operating lever; but instead of a series of clamps but one is employed, which is reciprocated longitudinally. The base *i* in this case, as in the other machine, serves as a sliding carriage, and is a long sliding bar fitted to suitable guides, *i'*, which assure its accurate location with reference to both saws while being reciprocated between them. The lever-spring may or may not be employed in this case; but its presence is not so important as in the other machine, because in this machine the hand of the tender need never be removed from the lever *e*, that serving not only as a handle to the clamp, but also as a handle for moving the clamp to and fro. The lifting of the lever sets the clamp firmly, and an upward pressure may be maintained thereon by the hand of the tender while the clamp is being moved forward with bone for sawing, thus causing a portion of the longitudinal pressure requisite for sawing to increase the holding capacity of the clamp, the base-bar *i* being confined by the front guide, *i'*, from rising during the application of the combined lifting and forward pressure indicated.

I have so constructed and arranged the lever *e*, the sliding bolt *d*, and link *e'* that the latter is subjected to no strain under the final clamping-pressure, because when the rear end of the lever is fully elevated it presents an abutting surface directly against the adjacent end of the sliding bolt *d*, and this involves as a desirable measure bone sections to be sawed which are substantially of the same length, and this is readily provided for in trimming or "cropping" the sections.

Although I have described the abutment *c* as "fixed," it will be understood that it is capable of a fixed adjustment longitudinally upon its base.

It is deemed best by me that the bone-clamp be movable with reference to the saws; but I do not limit myself thereto, except as indicated in the claims hereunto annexed, and while I prefer the sliding base as shown, I do not limit myself to that particular construction, except

as indicated in my claims, because I am well aware that approximately-desirable results may be obtained if the clamp-bed be located at the lower end of a pendent frame limited by suitable guides, so as to be swung by hand to and fro between the saws with a movement substantially corresponding to that of the sliding clamps illustrated, because the axis of the pendent frame, if located at a proper distance above the saws, would enable the clamp to move in the arc of a large circle, so that its path would deviate but little from a horizontal plane.

I am well aware that sawing-machines have heretofore been variously organized for a great variety of purposes; but I know of no machine prior to my invention embodying parallel saws and clamps which could be practically employed for the purposes herein indicated.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. In a bone-sawing machine, the combination, substantially as hereinbefore described, of a pair of parallel saws and a clamp which punctures and is thereby enabled to firmly engage with and hold pieces of bone by endwise contact therewith, said saws and clamp being movable with reference to each other, as described, whereby said clamp, with bone held therein, may be made to occupy the space between the saws, as and for the purposes specified.

2. In a bone-sawing machine, the combination, substantially as hereinbefore described, of a pair of parallel saws and a clamp adapted to puncture and thereby firmly engage endwise with pieces of bone by a puncturing contact with each end thereof, and mounted upon a sliding base passing between the saws.

3. In a bone-sawing machine, the combination, substantially as hereinbefore described, of a pair of parallel saws and a series of connected sliding clamps for holding sections or pieces of bone and traversing the space between the saws.

4. In a bone-sawing machine, the combination, substantially as hereinbefore described, of a pair of parallel saws, a series of connected clamps for holding sections of bone and presenting them to the saws, and releasing mechanism for automatically opening the clamps and releasing the sections of bone therefrom.

5. The combination of the parallel saws and a bone-holding clamp sliding between said saws, provided with a lever for opening and closing the clamp, substantially as described.

ALANSON C. ESTABROOK.

Witnesses:

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HOWELL BARTLE.