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A. P. WALLACE.

METHOD OF CUTTING BUTTON BLANKS FROM SHELLS.

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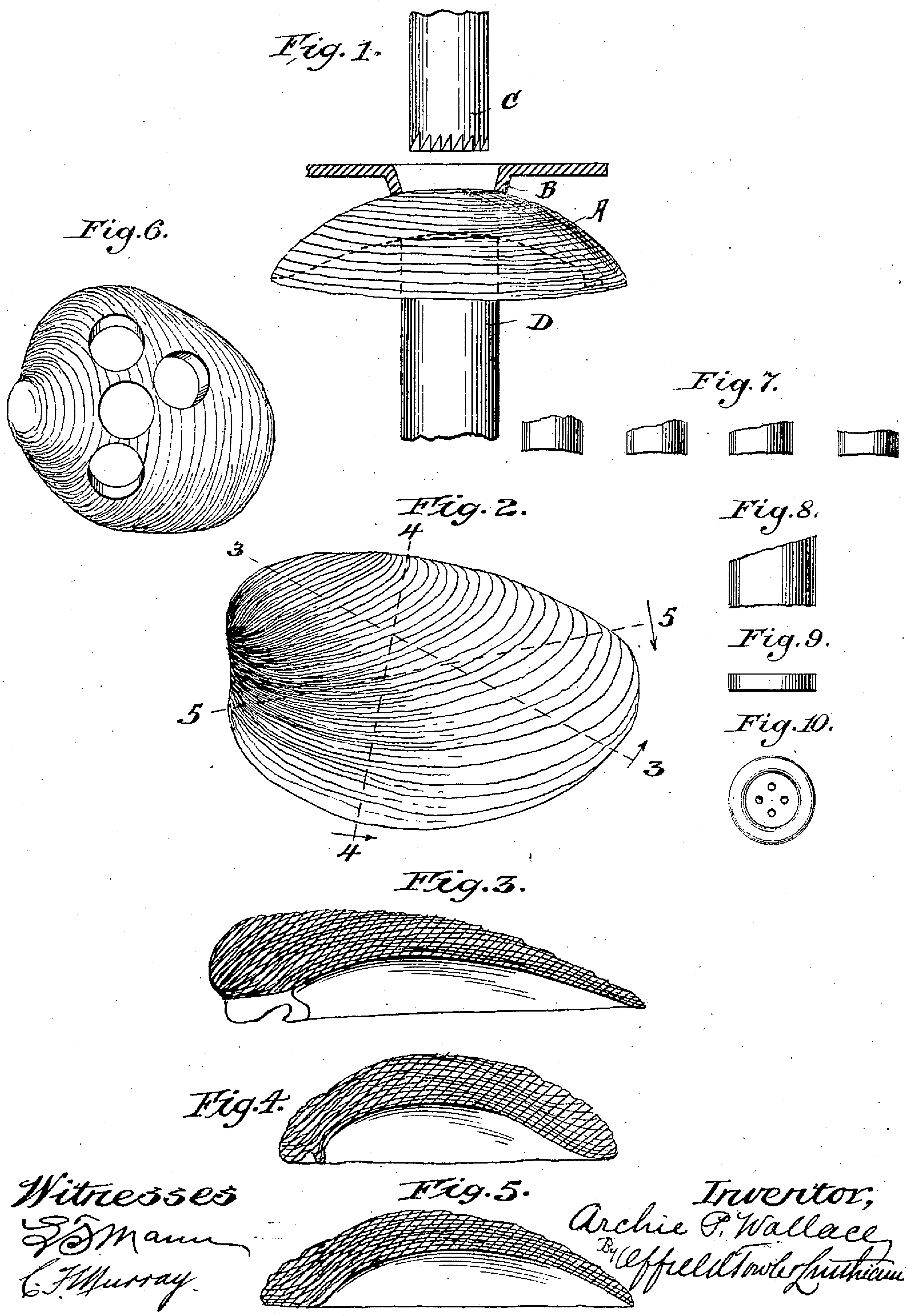

Witnesses
L. S. Mann
C. F. Murray.

Inventor,
Archie P. Wallace
By Offield Towle Linthicum
Att'ys.

THE NORRIS PETERS CO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

ARCHIE P. WALLACE, OF KEITHSBURG, ILLINOIS.

METHOD OF CUTTING BUTTON-BLANKS FROM SHELLS.

No 844,064. Specification of Letters Patent. Patented Feb. 12, 1907.

Application filed February 14, 1906. Serial No. 301,046.

To all whom it may concern:

Be it known that I, ARCHIE P. WALLACE, a citizen of the United States, residing at Keithsburg, Mercer county, Illinois, have invented a new and useful Method of Cutting Button-Blanks from Shells, of which the following is a specification.

The object of the present invention is the economical production of button-blanks from the fresh-water mussel-shell.

The shell of the fresh-water mussel is composed of a series of layers of elliptical outline and of successive growth, the layers being generated from the same point near the hinge and projecting progressively farther from the hinge and widening and tapering toward the edge of the shell, the bases of the succeeding layers being subjacent to those of earlier growth. The inner surface of each of these layers is composed of nacre, or what is known in the trade as "fresh-water" pearl, being distinguished from mother-of-pearl obtained from the deep-sea shells by a difference in luster and translucence. The shell is concavo-convex in form, the thickest portion being adjacent to the hinge and diminishing in thickness toward the edges. It results from this method of formation and from the form of the complete shell itself that its surfaces are curved and that any transverse section through the shell will present a tapering wedge-shaped form and that the sections will vary in thickness corresponding to the point at which they are taken. Furthermore, it will be understood that because of the peculiar layer formation of the shell itself any section taken at right angles to the inner or concave surface of the shell will intersect a plurality of these layers and that the general planes of these layers converge toward the apex or hinge-point of the shell and are nearly parallel to such inner or concave surface. These shells afford the material from which the so-called "fresh-water" pearl button of commerce is made. The common method of cutting button-blanks from this fresh-water mussel-shell is to employ a hollow rotary cutting-tool serrated on its edges and commonly called a "saw" and an abutment which is movable toward and from the saw and in line with the axis of the latter, the shell being placed with its back or convex side against the face of the movable abutment, which is thereupon moved to bring the inner or face side of the shell into contact with the rotary cutter. Owing to the fact that the abutment and tool are incapable of adjustment to positions angular with relation to the line of their movement, the curved back of the shell must be fitted or placed against the face of the abutment and the line of cutting must be parallel to a line extending through the axis of the cutter and at right angles to the face of the abutment. It results from this that the angle at which the cutting is done will vary with different shells and with the cutting of blanks from various parts of the same shell, and it rarely occurs that the line of cut through the body of the shell is at the same angle in any two blanks, and, further, in a large percentage of the blanks so cut the sides of the blank are not, as they should be, at right angles to the face of the blank. In this process of manufacture there are many defects inherent and unavoidable to which attention may be called for the purpose of better understanding my improvement. In the first place, the hardest substance of the shell is to be found on its interior surface, and the density decreases toward the outer surface or back of the shell, and in mussels of considerable age the back or outer layers begin to deteriorate and become soft and friable, so that the material can be readily cut with a knife.

The hardness of the interior surface of the shell is not materially affected by the age of the mussel. Heretofore the cutting has always proceeded from the face or inside of the shell, the shell being held with its face or concave side toward the cutter, the workman observing the position of the cutting-tool, so as to avoid its overlapping a previously cut aperture, which would result in producing a "moon-eyed" button. Furthermore, in this manipulation the only guide which the workman has in cutting the disk is to watch his saw, and therefore the shell is placed with its back against the abutment, and the shell is moved against the tool. Now the convex back of the shell is rarely such that a plane surface equal to the diameter of the button-blank is available for affording a rest for the abutment, and the result is that the seating of the abutment upon the shell is insecure, permitting the rocking or tipping of the shell and the consequent deflection of the cutting-tool. Furthermore, when the hard flint-like inner surface of the shell is presented to the teeth of the cutting-tool the latter are apt to be knocked "out of joint" or bend down, break off, or rapidly dull, because until the tool is firmly embedded in the shell material there is nothing to guide the teeth and lateral deflection is possible, while the inequalities of surface against which the teeth impinge is such that they do not all strike simultaneously, and the strain therefore comes on the teeth unequally. If the contact speed of the saw-teeth with the hard inner surface is high, these objectionable results and others are more likely to follow. By attentive consideration of the structure of these shells and of the objections inherent in the present methods of operation I have discovered that by reversing the direction of cutting a larger number of more perfect button-blanks may be produced from a given shell than has been possible by said old methods; and my invention consists, essentially, as hereinafter claimed, in holding the shell between the cutter and an abutment with its back toward the cutter and its concave face against the abutment and effecting relative movement of the cutter and abutment toward each other, whereby the cutter is caused to pass through the shell from back to face perpendicular to the face of the blank to be cut. The mechanism for performing this operation may be of widely-varying structure; but essentially it need comprise only a suitable abutment against which the inner face of the shell is placed, a clamp, and a rotating cutting-tool, each of which may be of known construction, the tool being made to cut from the exterior or back of the shell, while a relative movement is imparted either to the abutment or tool.

In the accompanying drawings, Figure 1 shows a typical arrangement of a cutting-tool and abutment for cutting the blanks. Fig. 2 is a perspective view of a common form of shell such as employed in this industry. Figs. 3, 4, and 5 are sections taken on corresponding lines of Fig. 2. Fig. 6 is a plan view of a shell cut according to my improved method. Fig. 7 shows in elevation the blanks cut from the shell of Fig. 6; and Figs. 8, 9, and 10 are views showing a perfect blank before and after the backing, facing, and drilling operations.

In operation it will be understood that the shell A will be held by the clamp B with its inner or face side against the movable abutment D and that the latter will be moved so as to bring the back of the shell into contact with the cutting-teeth of the tool C. By reason of the fact that the face of the shell is more nearly plane than the back, and the further fact that this inner face is concave, while the back is convex, it will be obvious that the shell will touch or bottom upon several points of the abutment. Theoretically the inner face of the shell will make contact by reason of its concavity with the entire periphery of the abutment, while the back of the shell will only contact with the abutment at a single point. Assuming, therefore, that the shell has made firm contact with the abutment, so as not to tip or rock thereon, the abutment may be moved to bring the back of the shell against the teeth of the saw at the normal rate of speed, and the saw will easily cut its way into the soft exterior portion of the shell material and will cut through the shell at right angles to the face of the abutment or perpendicular to the face of the blank, thereby producing blanks which, as will be seen from the illustrations in Fig. 7, have sides which are at right angles to the face. It will be seen also by observing the apertures of the shell as shown in Fig. 6, from which the blanks shown in Fig. 7 were cut, that the walls of said apertures are at right angles to the inner face of the shell.

In my method the shell having a more firm bearing on the abutment and the saw meeting with less resistance in cutting into the back of the shell, the slipping of the shell relative to the saw is avoided. The inequalities or malformation of the blanks above mentioned are not removed by the subsequent treatment which they receive. The button-blanks after being cut out are placed upon a traveling belt with their face or inner sides in contact with the belt, and the backs of the blanks are thereby brought under an emery-wheel, which removes the softer portions of the blanks and reduces them in thickness, as indicated by the comparative views of Figs. 8 and 9, Fig. 8 showing what is known as a "thirty-line" blank and Fig. 9 the same blank after being ground away. Now this grinding or backing operation, if applied to a button-blank whose sides are not at right angles to its face, accentuates the malformation in appearance, and the finished blank presents the form of an ellipse instead of being truly circular. The next operations consist in facing the blank, this being done by means of a milling-tool applied to the face or hard portion of the blank, and finally drilling the holes. These operations are performed while the blank is held in spring-clamps, which are designed to hold, of course, a circular blank. If the blank be, in fact, elliptical, the holes will not be drilled centrally of the blank. Most buttons are sewed on the garment by a machine having fixed needles coöperating with a button-clamp, and if the holes be eccentric the breaking of the needles will result, due to the improper location of the holes. It will be seen, therefore, that the fault in the original blank, due to its sides not being at right angles to its face, follows throughout its several operations and is most apparent in the completed button. Besides, if the blank be thus imperfect, in the backing and facing operations the grinding-wheel and the milling-tool will not be presented parallel to the layers of the blank, with the result that splitting or spudding is likely to occur, whereas if the sides of the blank be at right angles to its face in both the backing and facing operations the reducing action will occur in planes parallel to such face, and the difficulties above mentioned will be avoided.

For many purposes it is desired to have a thick button-blank, and therefore it is desirable to avoid the splitting off of the back, which almost invariably accompanies the old method of cutting, due to the fact that the tool after it penetrates through the harder parts runs with great rapidity through the softer parts of the shell and sometimes at other than a right angle, therefore tending to spud or split off the back layers. In my method of cutting the splitting or spudding of the blank may be practically eliminated.

The following are the chief advantages secured by my improved method: First, the shell may be firmly held upon the abutment and any rocking or tipping thereof prevented; second, the feed may be faster in the beginning of the operation—*i. e.*, while the tool is cutting through the soft material; third, the splitting or spudding of the blank and the checking of its edges is avoided; fourth, a more perfect blank—*i. e.*, one having its sides at right angles to its face, its layers parallel, and its contour circular—is procured; fifth, a larger number of perfect blanks can be produced from a shell of given size than by the older methods.

While I have described my invention as applied to the treatment of fresh-water shells, it is obvious that it will be useful in connection with the cutting of all concavo-convex shells.

I claim—

1. The herein-described method of producing button-blanks from concavo-convex shells which consists in cutting through the shell from back to face in a direction substantially perpendicular to that portion of the concave face of the shell forming the face of the blank to be cut, substantially as described.

2. The herein-described method of producing button-blanks from concavo-convex shells which consists in holding the shell with its back toward a cutter and with its concave face upon a steadying-abutment having a contact or bearing surface of approximately the area of that portion of the shell forming the face of the blank to be cut and relatively moving the abutment and cutter in lines perpendicular to the face of the abutment, substantially as described.

In testimony that I claim the foregoing as my invention I have hereunto set my hand this 10th day of February, A. D. 1906.

ARCHIE P. WALLACE.

Witnesses:
C. C. LINTHICUM,
L. F. McCREA.