

April 18, 1961

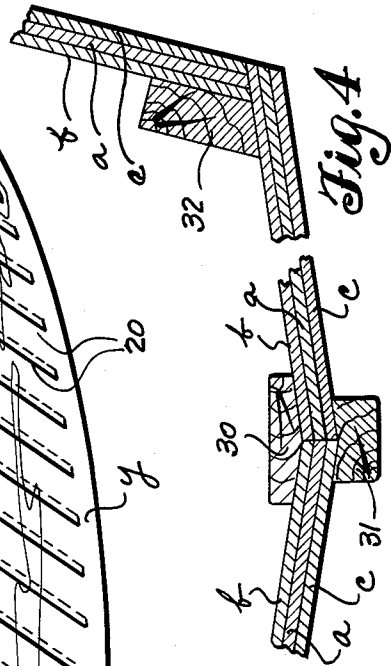
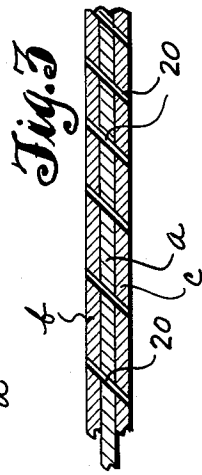
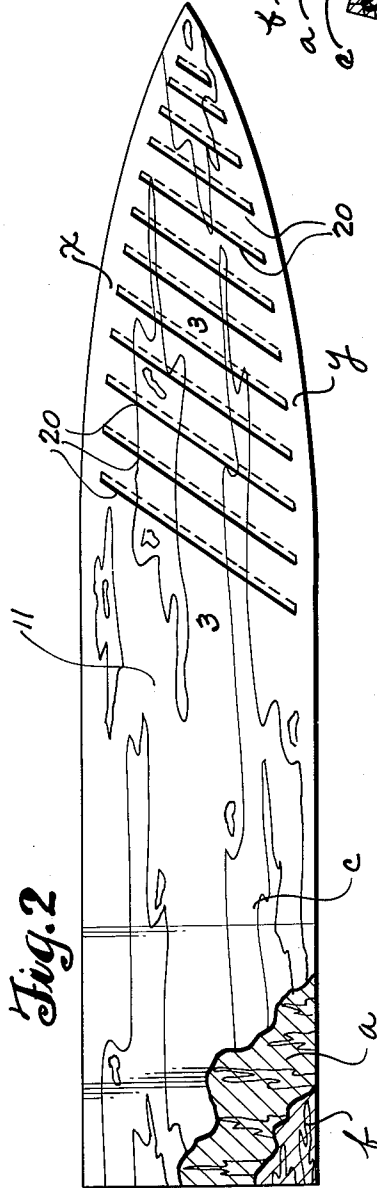
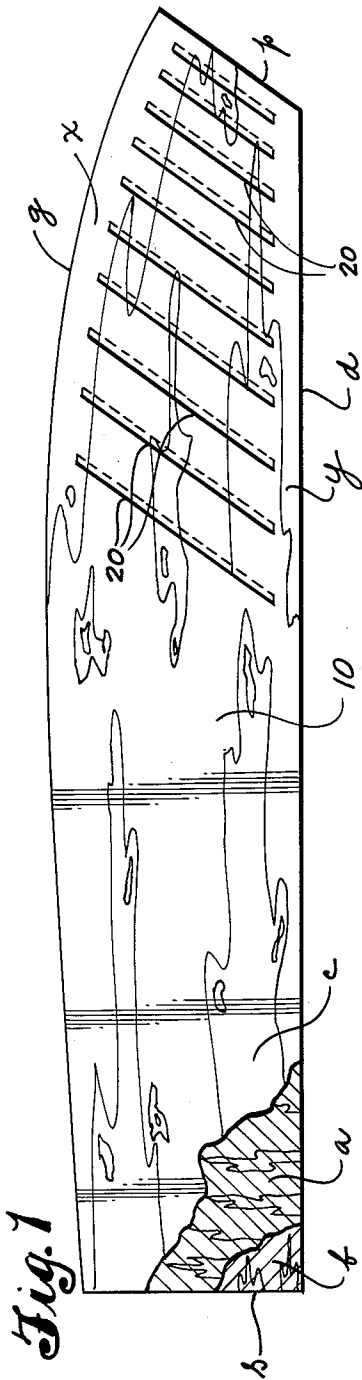
O. P. BURCH

2,980,153

METHOD OF PREPARING PLYWOOD PLANKING FOR COMPOUND BENDING

Filed Nov. 12, 1958

3 Sheets-Sheet 1



INVENTOR.
OREN P. BURCH

BY
Johnson + Berry
ATTORNEYS

April 18, 1961

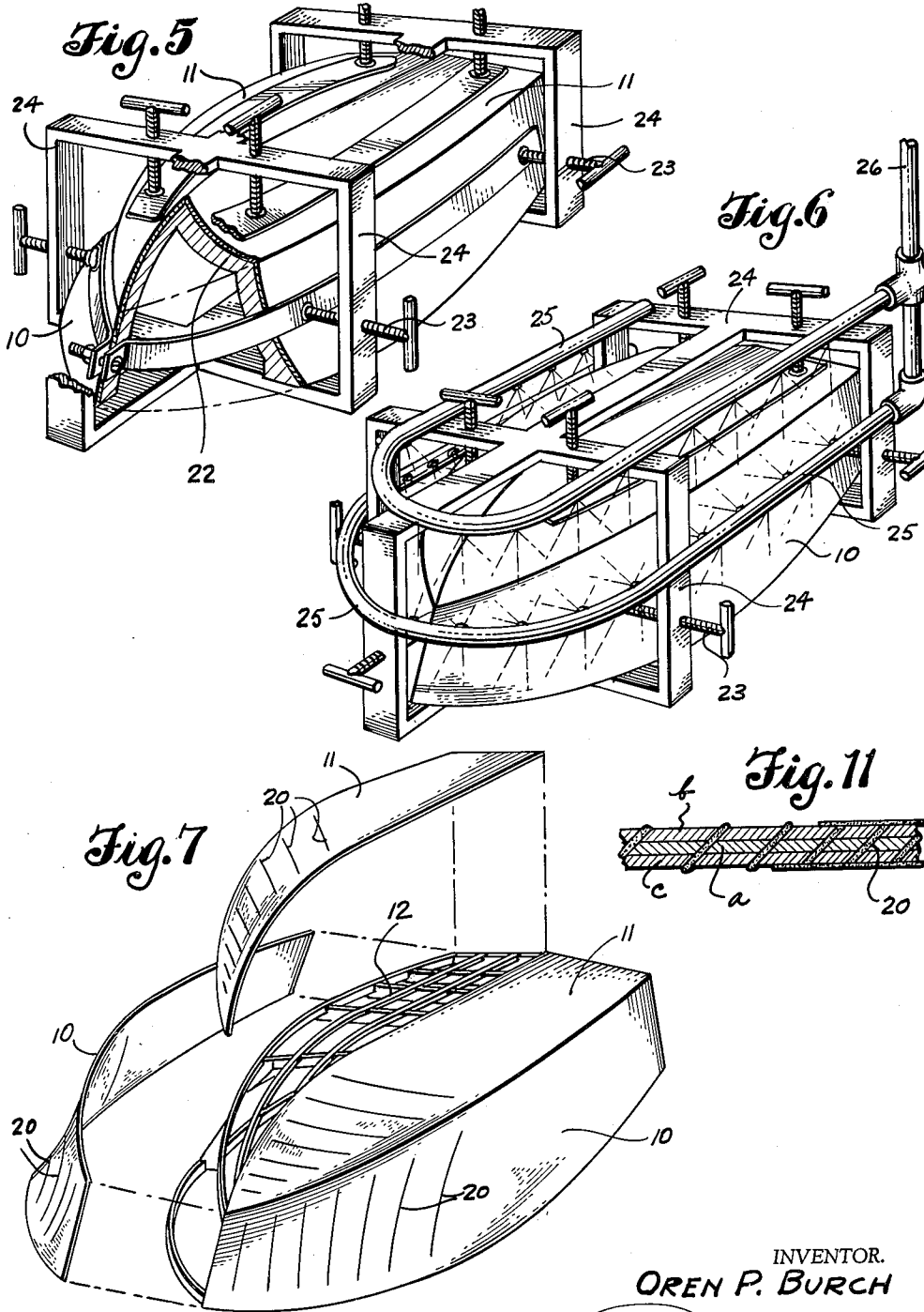
O. P. BURCH

2,980,153

METHOD OF PREPARING PLYWOOD PLANKING FOR COMPOUND BENDING

Filed Nov. 12, 1958

3 Sheets-Sheet 2



INVENTOR.
OREN P. BURCH
BY *Robinson & Berry*
ATTORNEYS & C.

April 18, 1961

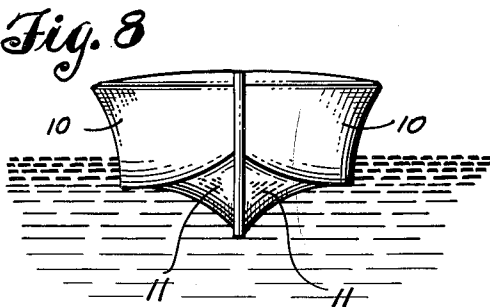
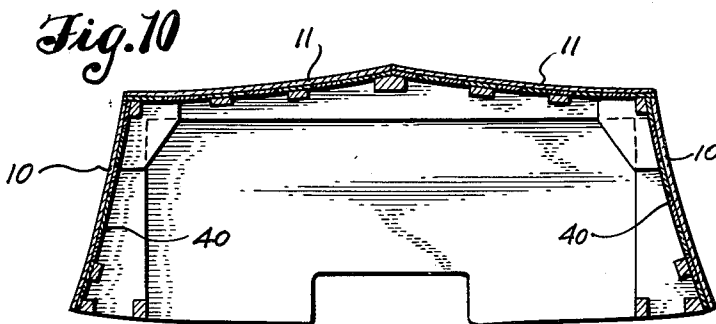
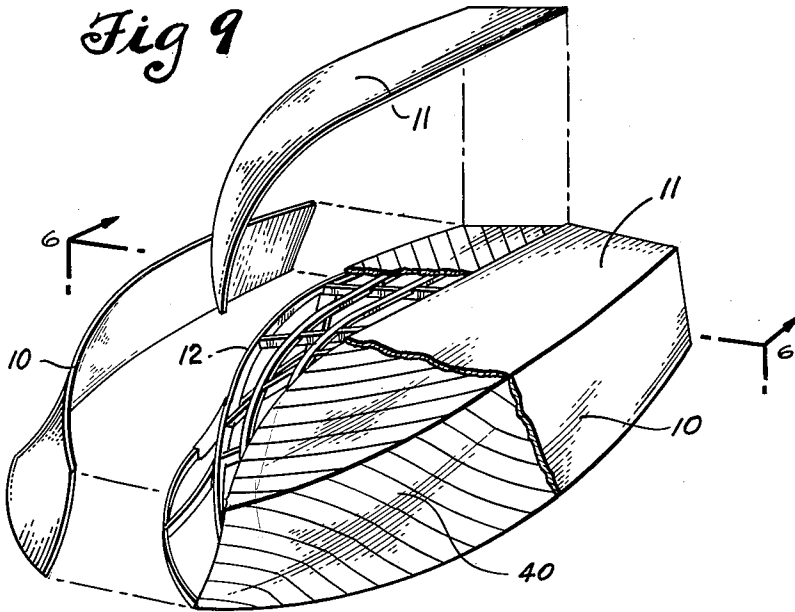
O. P. BURCH

2,980,153

METHOD OF PREPARING PLYWOOD PLANKING FOR COMPOUND BENDING

Filed Nov. 12, 1958

3 Sheets-Sheet 3



INVENTOR.
OREN P. BURCH
BY
Robinson Berry
ATTORNEYS

1

2

2,980,153

METHOD OF PREPARING PLYWOOD PLANKING FOR COMPOUND BENDING

Oren P. Burch, Rte. 19, Box 62, Aberdeen, Wash.

Filed Nov. 12, 1958, Ser. No. 773,372

8 Claims. (Cl. 144—324)

This invention relates to boats and to methods of building boats. More particularly it has reference to improvements in methods of building the hulls of what are generally referred to as pleasure boats, but not necessarily confined thereto, from plywood.

Row boats and pleasure boats, as designed for propulsion by inboard as well as outboard motors, have heretofore been built with hulls formed principally from plywood. However, it has not been possible to give to plywood formed hulls the more attractive lines, curves or shapes that are possible when made of plastic or fiber glass; this being due in most part to the fact that plywood panels do not lend themselves to compound bending such as, for example, that bending that is desired especially in the shaping of the prow forming portions of the hull.

It has been the principal object of this invention to provide a method of preparing plywood hull forming panels, or what will hereinafter be designated as "planks," that permits them to be readily given the compound bends, curves or shapes that are so desired in boat building as a means of enhancing the design and bettering the performance of the boat in the water.

It is also an object of the present invention to provide a method of preparing the side and bottom forming planks for application to boats that are double planked as well as those that are single planked.

More specifically stated, the present invention resides in the manner of slitting the plywood panels or planks which are given the curves of compound bends that are so desirable.

Further objects and advantages of the invention reside in the manner of forming the slits in the plywood; in the relationship of the slits to each other and to their angular direction through the planks and to the gunwhale or chine line of the boat in order to best suit the character and degree of the bend to be made.

Still further objects and advantages of the invention reside in the use of a plastic filler in the kerfs or slits as formed through the planks to seal them and to restore the original strength to the planks after being shaped and before or after they are secured to the frame structure of the boat.

In accomplishing the above mentioned and other objects of the invention, I have provided the improved details of construction, the present preferred forms of which are illustrated in the accompanying drawings, wherein:

Fig. 1 is a flat view of a plywood side plank as formed with slits in accordance with the teaching of the present invention to adapt it for the desired compound bending to best suit its present use.

Fig. 2 is a flat view of a plywood bottom plank as formed with slits according to the teachings of the present invention to permit its being given a compound bend.

Fig. 3 is an enlarged cross-sectional view through a slit containing portion of a plank as seen on line 3—3 in Fig. 2 showing the angular direction of the slits through the plank.

Fig. 4 is a cross-sectional detail of a portion of a boat hull showing the keel and chine joints.

Fig. 5 is a perspective view illustrating a means for and the manner of clamping the prepared side and bottom planks of a boat hull to a mold for their pre-shaping treatment.

Fig. 6 is a perspective view illustrating a means for the steam or hot water treatment of the prepared planks after they have been clamped to the mold.

Fig. 7 illustrates the application of the pre-shaped plywood planks to the frame structure of a boat.

Fig. 8 is a front end view of a finished boat, illustrating the transverse curvature given to side and bottom forming planks.

Fig. 9 illustrates the application of prepared and pre-shaped plywood plank to a boat having a planked under frame structure.

Fig. 10 is a cross-sectional view of the boat of Fig. 9.

Fig. 11 (Sheet 2) is an enlarged cross-sectional view of a plank, showing their slits or saw kerfs as filled and sealed with a selected plastic.

Referring more in detail to the drawings:

While the teachings of the present invention may be employed in the manufacturing of boats of various sizes and kinds, it has herein been illustrated in the construction of a typical form of pleasure boat; such boats being designed for propulsion by means of oars or by outboard motor. Their construction may be considered "lightweight" as exemplified by the showing in Fig. 7, or "heavy" as exemplified by that in Fig. 8.

It is indicated particularly in Fig. 7, that the boat is formed from paired, opposite side planks, of the general character of that shown in Fig. 1, and paired bottom planks corresponding to that of Fig. 2. These planks after being prepared and molded to the desired shapes, are applied to the boat frame, as indicated in Fig. 7. In the building of larger boats, it may require the use of two or more planks for each side of the hull and for each of the paired bottom sections. However, the present method applies to all hull forming parts made of plywood regardless of size or design of the boat.

For the present the invention will be considered as applied to the making of a hull for a small sized boat according to the showing in Fig. 7, where single plywood planks extend to its full length. For this boat, I have provided paired, opposite side planks 10—10 and paired bottom planks 11—11, which are applied over the usual frame structure such as that designated generally in Fig. 7, by reference character 12.

The side forming planks are cut to a predetermined pattern or form such as that shown in Fig. 1 wherein it is indicated that the plank 10 is made from a single three ply panel wherein the grain of the core material, designated by character *a*, is directed transversely of the plank and that the grain of the inside and outside plys, *b* and *c*, is directed lengthwise of the plank. The gunwhale edge *g* of the plank is here shown to be upwardly curved and the chine edge *d* is here shown to be substantially straight from end to end. The prow edge *p* is shown here to be forwardly and upwardly inclined from the straight lower edge and the stern edge *s* is substantially at a right angle to the chine edge *d*. However, the particular pattern of each plank would be predetermined so that when ultimately shaped to the mold and joined, a boat hull of the desired form would be produced therefrom.

As was previously explained, the principal object of this invention resides in the preparing of the planks from plywood panels and the specific manner of slitting the planks to permit them to be given the desired compound bends, such as has been indicated by the showing of the front end of the boat, in Fig. 8 where it is observed that

the transverse bending of planks is quite substantial, as also is the degree of longitudinal bending required to form the prow. To permit the planks to be bent in this way, they are formed in those areas where compound bending is required, with a succession of slits as shown at 20 in Figs. 1 and 2. These slits are formed with saws and since they are the saw kerfs they will hereinafter be referred to as "kerfs." This is intended to indicate a slit that has width. These kerfs as formed in the planks, are substantially parallel, and their spacing is in accordance with the extent of compound curvature required. For example, if the compound bending in any area is to be rather severe, then the spacing of kerfs in that area is quite close. This would apply in the present instance to the prow forming portions of parts 10—10. As the transverse curvature is decreased, then the spacing of the kerfs can be increased accordingly. In the ordinary type of pleasure boats, the spacing of the kerfs in the more sharply curved portion of the prow is about 2 inches, and this gradually is increased as the degree of curvature is decreased.

It is of importance in the forming of the saw kerfs in the plywood panels that they terminate at their opposite ends short of the longitudinal edges of the planks. This distance of termination from the plank edges may be from three to four inches. It has been shown in Figs. 1 and 2 that the termination of the kerfs provides uncut longitudinal opposite edge portions *x* and *y* extending the full length of the slit containing areas.

It is also a feature of this invention that the saw kerfs are substantially parallel and also are formed at an angle relative to the longitudinal direction of the plank, as shown in Figs. 1 and 2, and also are cut at an angle through the pieces, as has been illustrated in Fig. 3.

For most construction, the kerfs extend approximately at an angle of 45° relative to the longitudinal line of the plank, and at an angle of from 45° to 20° to the face of the plank.

Assuming that the flat planks 10—10 and 11—11 have been cut from plywood panels to the desired pattern and that the kerfs have been formed therein in the manner heretofore described and as herein illustrated, they are then placed for preforming in position on the corresponding surfaces of a mold of the desired shape such as that designated by numeral 22 in Fig. 5, and are then pressed into conformity therewith. This step is herein referred to as the "pre-forming" step or operation, and it is completed without subjecting the planks to steam or water treatment. For this pre-forming operation, suitable clamps are employed, such as for example, the clamp screws 23 shown to be mounted in a frame structure 24 that encloses and mounts the mold 22. Clamping pressure is applied at all areas necessary to cause the planks to conform to the shape of the mold, as indicated in Fig. 5.

After the planks have been thus brought by the clamping pressure to form and while so held, firmly and securely, they are subjected to a plasticizing treatment that is effected by blowing wet steam or hot water over the outer surfaces of the planks. This treatment which may be carried out within an enclosure, is continued until the fibers and lignin of the wood have become plastic or moldable. Under this treatment the planks will lose their natural resiliency and will yield into close conformity to the surfaces of the mold.

Various ways and means might be employed for this treatment, however, in Fig. 6, I have shown the plasticizing apparatus to comprise a plurality of header pipes 25 from which steam or hot water can be discharged at the places of use; the headers being applied about the clamping frame and connected with a supply pipe line 26.

When the plasticizing treatment has been completed, the planks, while still held by the clamps, are subjected to cooling and drying. This may be carried out by the

blowing of warmed air against the panels through the same piping system employed for the plasticizing treatment.

After the period of cooling, continued until the wood fibers have set in the planks as preformed on the mold, the clamps are removed and the plastic filler applied, as in the case of "Kit" boats, or they are taken from the form and ultimately applied to and secured in the usual way to the frame structure 12 provided for the boat. It has been found practical to overlay the abutted edges of the bottom forming planks 11—11 with inside and outside keel strips as shown at 30 and 31 in Fig. 4, and to join the lower edges of the sidewall planks 10—10 with the outer edges of the bottom planks, with chine strips as at 32. It is to be understood, however, that any suitable means for and method may be employed for the joining of planks to the frame.

It is further to be explained that the planks so formed might likewise be formed for and applied to what are designated as double planked boats such as that illustrated in Figs. 9 and 10, wherein the under planking is designated by numeral 40. The method of preparing the planks 10—10 and 11—11 for double planked boats is not necessarily the plasticizing treatment. The method of securing the outer planking would be in accordance with present day practice.

The final finishing of the boat hull after the sidewall and bottom planks have been secured to the frame is to fill the kerfs with a suitable plastic that can be applied thereto in liquid or semi-liquid form and which will set as a hard, waterproof bonding and sealing agent. This not only fills the kerfs but, upon setting, restores the original strength of the material. At present, I employ "Flex-Bond Mastic." This particular plastic material, after being applied to the kerfs and over the surfaces of the planks, can be sanded smooth and given a high polish by buffing.

What I claim as new is:

1. A method of preparing plywood panels for compound bending, the method comprising forming those areas of the panels that are to be subjected to compound bending with a plurality of substantially parallel saw kerfs cut completely through the thickness of the panel and directed angularly across the panels with respect to their lengthwise direction, and said kerfs being directed angularly with respect to the surfaces thereof and terminating at their opposite ends short of the longitudinal edges of the panels thus leaving the panels with uncut opposite edge portions of normal strength and rigidity.

2. The method recited in claim 1 wherein the kerfs are cut through the panels approximately at an angle of 45° with respect to their surfaces and at approximately 45° relative to their longitudinal direction.

3. The method recited in claim 1 wherein the spacing of the saw kerfs is decreased and increased, respectively, in accordance with the increase and decrease of the sharpness of the compound bend that is to be made.

4. In the fabrication of a boat hull from plywood panels; the method of preparing the panels for compound bending comprising forming those areas which are to be subjected to compound bending with a succession of substantially parallel saw kerfs cut completely through and directed angularly across the panels with respect to their longitudinal edges and terminating within said edges thus leaving uncut opposite edge portions of normal strength and rigidity, said cuts being at less than a 90° angle to the surface of the panels, then clamping said panels to a boat mold to bend the panels to the desired form and subjecting panels while so clamped, to steam heat sufficient to soften the fibers and lignin of the panels and eliminate the resiliency of the material, then subjecting the panels to drying thus to cause the panels to set to the shape of the mold.

5. The method recited in claim 4 including also the

5

filling of the saw kerfs as cut through the panels, while clamped to the mold, with a water proof, hand setting plastic glue, and allowing the glue to set and harden and thereafter releasing the clamping force.

6. The method recited in claim 5 wherein the spacing of the saw kerfs is decreased or increased, respectively, in accordance with the increase or decrease in the sharpness of the bends to be made therein, and said saw kerfs are directed across the panels approximately at a 45° angle to their longitudinal edges and are cut through the panels at approximately a 45° angle to their surfaces.

7. A plywood panel adapted to be formed into compound bends, said panel comprising a plurality of layers of wood veneer, the layers of veneers having the grain thereof running at right angle to the grain in the adjacent layers of veneers, said veneers being bonded together with an adhesive, said panels having a plurality of saw cuts formed therein in parallel relationship and completely through the panel, said saw cuts being directed angularly across the panel with respect to the

6

longitudinal direction thereof and terminating short of the longitudinal edges and said saw cuts being formed at an angle of less than 90° to the surfaces of the panel.

8. A panel as in claim 7 wherein the saw cuts are directed across the panel at an angle of approximately 45° and at an angle of approximately 45° to the surfaces of the panel.

References Cited in the file of this patent

UNITED STATES PATENTS

| | | |
|-----------|----------------|---------------|
| 416,505 | Schnabel | Dec. 3, 1889 |
| 1,250,480 | Marten et al. | Dec. 18, 1917 |
| 1,330,804 | Haskell et al. | Feb. 17, 1920 |
| 1,461,471 | Bancroft | July 10, 1923 |
| 2,220,898 | Franklin | Nov. 12, 1940 |
| 2,253,219 | Alexander | Aug. 19, 1941 |
| 2,347,820 | Francek | May 2, 1944 |
| 2,412,455 | Hall | Dec. 10, 1946 |
| 2,535,195 | Colucci et al. | Dec. 26, 1950 |