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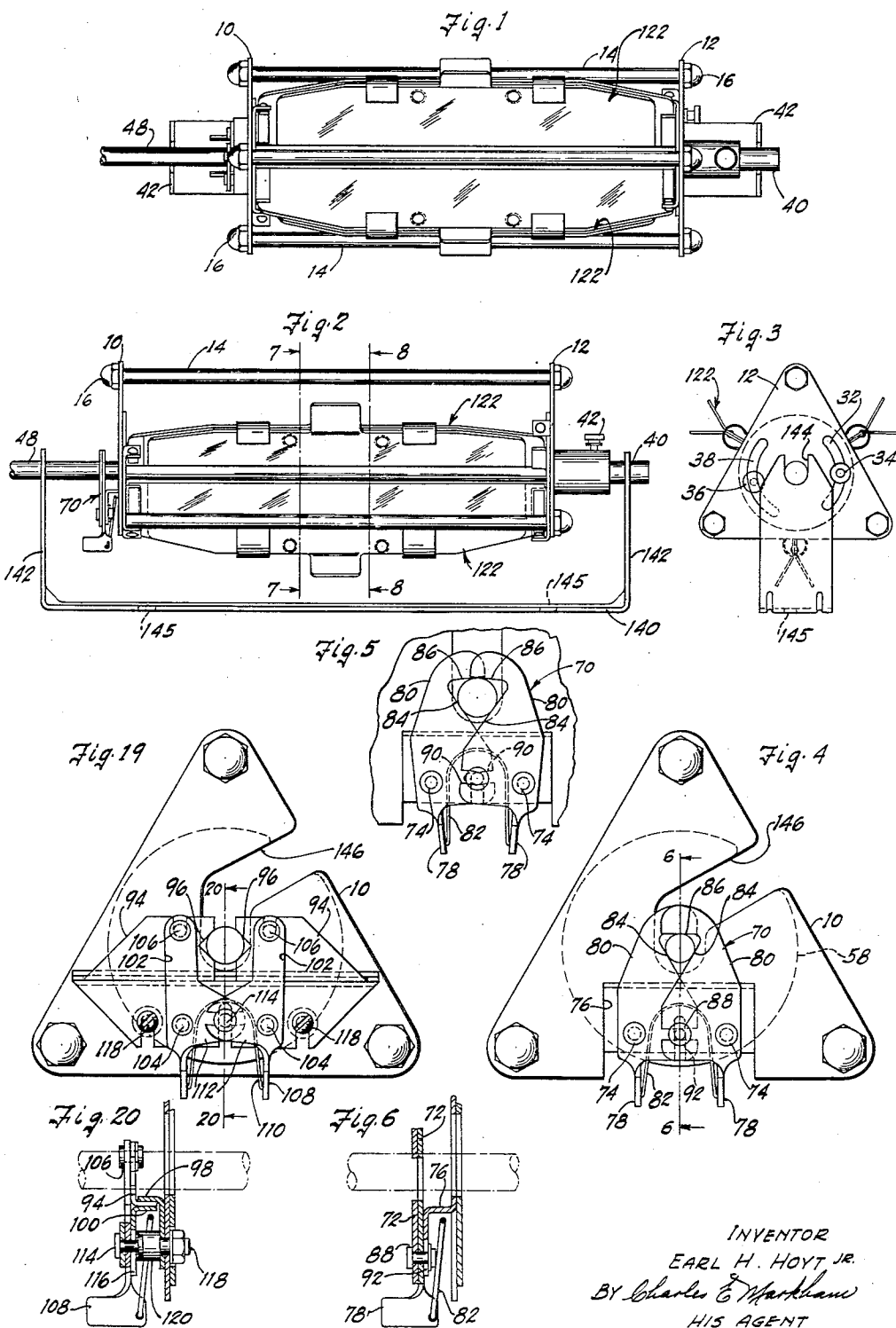
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ARROW FLETCHING DEVICE

· Filed April 15, 1955

2 Sheets-Sheet 1



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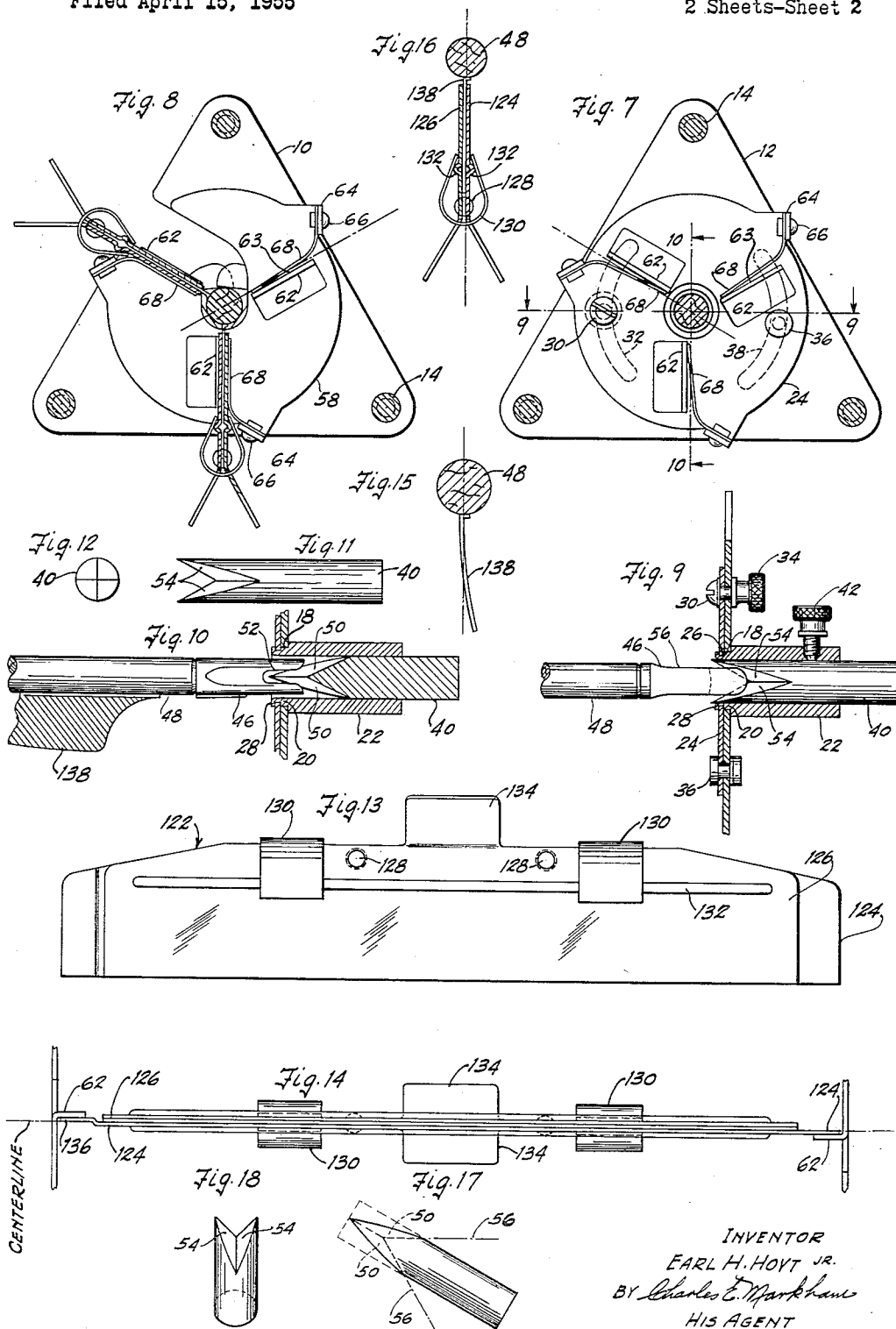
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INVENTOR
EARL H. HOYT JR.
BY *Charles E. Markham*
HIS AGENT

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ARROW FLETCHING DEVICE

Earl H. Hoyt, Jr., Edmundson, Mo.

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10 Claims. (Cl. 144—289)

This invention relates to a device for accurately positioning and holding feathers against an arrow shaft while gluing.

The primary object of the invention is to provide a generally new and improved arrow fletching jig of simple and inexpensive construction and dependable operation with which the semi-skilled operator may accurately position and glue three or more feathers to an arrow shaft at one time.

A further object is to provide an arrow fletching jig of novel construction which is universally adaptable to accurately position and hold a plurality of either right or left wing feathers for either straight or spiral style fletching.

A further object is to provide novel means in an arrow fletching jig for quickly and accurately aligning and clamping arrow shafts of varying diameters in position for either spiral or straight style fletching.

A further object is to provide novel means in an arrow fletching jig for slidably receiving and retaining the feather clamps in proper position with relation to the arrow shaft.

A further object is to provide a feather clamp which is efficient, light in weight, and of simple and inexpensive construction.

A further object is to provide a multiple fletching jig for arrows which is mounted for rotation about the arrow axis so that the angularly spaced points about the arrow at which feathers are to be attached may be consecutively moved into a position of convenience for the operator.

Other objects and advantages will become apparent upon reading the following description in connection with the accompanying drawings.

In the drawings:

Fig. 1 is a top plan view of an arrow fletching device constructed in accordance with the present invention;

Fig. 2 is a side elevational view of the device shown in Fig. 1;

Fig. 3 is a right end elevational view of the device;

Fig. 4 is an enlarged left end elevational view of the frame showing the arrow shaft centering and clamping device in the position of clamping a relatively small diameter arrow shaft;

Fig. 5 is a fragmentary view showing the clamping device of Fig. 4 in the position of clamping a relatively large diameter arrow shaft;

Fig. 6 is a fragmentary cross-sectional view taken on line 6—6 of Fig. 4;

Fig. 7 is an enlarged cross-sectional view with the feather clamps removed and is taken on line 7—7 of Fig. 2;

Fig. 8 is an enlarged cross-sectional view with one of the feather clamps removed and is taken on line 8—8 of Fig. 2;

Fig. 9 is a cross-sectional view taken on line 9—9 of Fig. 7;

Fig. 10 is a fragmentary cross-sectional view taken on line 10—10 of Fig. 7;

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Fig. 11 is a side elevation of the nock end centering element;

Fig. 12 is an end elevation of the nock end centering element;

Fig. 13 is a side elevation of the feather clamp;

Fig. 14 is a bottom plan view of the feather clamp shown in Fig. 13;

Fig. 15 is a cross-sectional view of an arrow shaft with a feather attached thereto showing the natural curvature of wing feathers used in fletching;

Fig. 16 is a cross-sectional detail view showing the relationship of the feather clamp to the center line of the arrow shaft;

Figs. 17 and 18 are side and end views of the nock end centering element showing the manner in which cuts are made to provide the centering surfaces;

Fig. 19 is a left end elevational view of the frame showing a second form of the arrow centering and clamping device, and

Fig. 20 is a fragmentary cross-sectional view taken on line 20—20 of Fig. 19.

The device comprises a rigid frame having triangular end plates 10 and 12 which are spaced and rigidly fixed in parallel relationship by three parallel, shouldered rods 14 which have reduced screw threaded ends extending through clearance holes in the end plates and receive acorn nuts 16. The end plate 12 has an aperture 18 which receives the reduced portion 20 of a sleeve member 22, see Figs. 9 and 10. Lying against the inside of end plate 12 is a disc member 24 having a central aperture which receives the further reduced end portion 26 of the sleeve 22. This further reduced end portion 26 extends through disc 24 and is formed over as at 28 so as to rivet the disc 24 securely against the shoulder of the sleeve formed by the second reduction in diameter. The sleeve and disc, therefore, rotate together and are journaled in aperture 18 in the end plate.

The disc 24 carries a screw 30 which projects through the end plate and travels in an arcuate aperture 32 in the end plate as the disc and sleeve are rotatably adjusted. A knurled nut 34 on screw 30 is provided to clamp the disc firmly to the end plate in an adjusted position. A shouldered rivet 36 carried in the disc 24 and traveling in a diametrically opposed arcuate aperture 38 insures that the disc remains flat against the end plate at all times.

The sleeve 22 receives therein a cylindrical, nock end centering element 40 which is longitudinally and rotationally adjustable in the sleeve, and a set screw 42 is provided to lock the element in any adjusted position. The element 40 has a bifurcated inner end for receiving a conventional arrow nock indicated at 46. The bifurcated end of the element is formed so as to present two pairs of nock centering surfaces for centering the arrow nock and, consequently, for centering the end of the arrow shaft 48 to which it is attached. The surfaces 50 of one of the pairs of centering surfaces diverge inwardly in one plane from the end of the element and are engaged by the side 52 of the nock bow string slot, as indicated in Fig. 10, to center the arrow shaft in a first plane. The other pair of nock centering surfaces, indicated at 54 in Fig. 9, converge inwardly from the end of the element with respect to a plane lying at 90° to the first said plane and are engaged by the side 56 of the nock to center the arrow shaft in this second plane which lies at 90° to the first said plane.

Figs. 11 and 12 show side and end views of the element 40, and Figs. 17 and 18 show side and end views of the element placed in a tilted position for the purpose of more clearly illustrating the arrangement of the two pairs of centering surfaces. One simple method of constructing the element is to make two V cuts at the end of a cylindrical rod along the lines 56 at an acute angle

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to the rod axis, as indicated in Fig. 17, with a V-formed milling cutter or abrasive wheel. Obviously the element could also be formed as a casting of suitable metal or plastic material.

Lying against the inside surface of the end plate 10 is a second disc 58 which is fixed to the end plate as by spot welding. Both discs 24 and 58 are provided with stamped out, formed up guide elements 62 for positioning the feather clamps. These guide elements have surfaces 63 adapted to be engaged by one blade of the feather clamps. These surfaces 63 extend parallel to a radial line passing through the disc center, but are offset from the radial line by an amount equal to the thickness of one blade of the feather clamp, as indicated in Figs. 7 and 8. The three guide elements 62 on each disc are shown arranged at 120° apart, and it will be noted that the guide elements on one disc are offset to one side of a parallel radial line passing through the disc center while the guide elements on the other disc are offset to the other side of this radial line.

Adjacent each guide element 62 is a formed ear 64, each of which ears carries rigidly attached thereto, by rivets 66, one end of a formed leaf spring 68. The spring 68 has a straight portion which bears against the adjacent surface 63 of the guide element, and the leaf springs are so formed that, when the blade of a feather clamp is inserted between a spring and the guide element, the spring bears flatly against the blade of the feather clamp substantially the full length of the guide element, as indicated in Fig. 8.

Mounted on the outside surface of the frame end plate 10 is an arrow centering and clamping device, generally indicated at 70, for clamping arrow shafts at an intermediate point in such manner that the axis of an arrow shaft, regardless of its diameter, will always coincide with a longitudinal center line passing through the centers of discs 24 and 58. The clamp 70 comprises a pair of overlapping blades which are pivotally mounted at an intermediate point on spaced pivots 74 carried on an outwardly formed bracket 76 which is formed as part of end plate 10. Each of the blades has a portion 78 extending downwardly from its pivot point, which portion is formed as a handle, and each of the blades has a portion 80 extending upwardly from its pivot point. A formed spring 82 biases the handle portions 78 apart and the upper overlapping portions 80 towards each other. Each of the upper blade portions 80 has a pair of adjacent inner surfaces 84 and 86 forming an internal angle of 60°. The two pairs of surfaces or blades 80 cooperate to engage and clamp an arrow shaft placed therebetween at three points.

Referring to Fig. 4, the clamping device is shown in the position it assumes when clamping an arrow shaft of predetermined diameter. In this position, the surfaces 84 form an included angle of 60°, which is bisected by a vertical line passing through the center of disc 58, and contact the periphery of the arrow at two points lying 120° apart. Also, in this position the surfaces 86 are horizontal and form with the surfaces 84 an equilateral triangle wherein the arrow shaft is engaged at three points, two points of which lie 120° apart and a third point which lies 120° from each of the said two points.

When a larger diameter arrow is placed in the clamp, the included angle between surfaces 84 increases, and the horizontal surfaces 86 are inclined so that the points thereon now in contact with the larger diameter arrow are elevated, as indicated in Fig. 5, and the arrow shaft is actually contacted at four points. The points of contact of surfaces 86 are, however, quite close together. By correct positioning of the pivot points 74 with relation to the surfaces 84 and 86, a range of arrow diameters can be clamped so as to maintain their axes substantially on a line passing through the centers of discs 24 and 58. The blades 80 are held in parallel overlapping relationship and against the mounting bracket 76 by a shouldered rivet 88 passing through the clamp blades and the bracket. The rivet 88 is movable along slots 90 in the clamp blades and a slot 92 in the bracket as the blades are pivoted.

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A second form of arrow clamp is shown in Figs. 19 and 20. In this form a pair of horizontally guided, angle members 94, each having a horizontally arranged, V-groove 96, cooperate to align the axis of an arrow shaft with a line passing through the centers of discs 24 and 58. The angle members 94 have horizontal legs which are guided between upper and lower horizontal legs of angle guide members 98 and 100, and the apices of the V-grooves 96 are, therefore, always on a horizontal center line through the discs. A pair of levers 102 pivoted at points 104 each have a leg extending upwardly from its pivot point, which leg is pivotally connected at 106 to one of the horizontally slidable members 94. Each of the levers 102 also has a portion 108 extending downwardly from its pivot point, which portion is formed at right angles to provide a handle. A formed spring 110 acting between the handles 108 to bias them apart constantly urges the horizontally guided members 94 toward each other to center and clamp an arrow shaft placed therebetween.

The levers 102 have overlapping portions 112, and a shouldered rivet 114 passing through the overlapping portions 112 and the vertical leg 116 of the lower guide member retains the levers 102 in parallel relationship with the end plate. The rivet 114 is movable in slots in the overlapping lever portions and in the lower guide member, and pivots 106 are slidable in slots formed in the sliding members 94 when the levers 102 are rotated about their pivots. The upper and lower angle guide members 98 and 100 are rigidly attached to the frame end plate by bolts 118 and spacers 120.

One of three similar feather clamps, generally indicated at 122 in Figs. 1 to 3, is shown in detail in Figs. 13, 14, and 16. The clamp consists of a pair of blades 124 and 126 lying side by side. The blades are spaced slightly at their upper edges by a pair of longitudinally spaced balls 128 lying between the blades and partially entering holes in the adjacent blades, which holes are slightly smaller than the diameter of the ball. A pair of formed spring clips 130 extending over the upper edges of the blades and having their ends bearing oppositely upon the blades at a point below the balls 128 act to hold the plates together and constantly urge the blades to pivot about the balls 128 in a direction to move the lower free edges of the blades together. The blades are made of relatively thin material to minimize weight, and in order to achieve the desired rigidity, they are each provided with an outwardly formed, longitudinal rib 132. The ends of spring clips 130 extend over the ribs 132 and engage the flat surfaces of the blades slightly therebeyond. This arrangement retains the spring clips in alignment and prevents their slipping off the blades, while at the same time, they may be conveniently assembled on the blades by slipping them on longitudinally from the ends of the blades. Each of the blades is provided with an integrally formed handle portion 134 at its upper edge.

The blade 124 is slightly longer than blade 126 and extends beyond blade 126 at both ends thereof. These extending ends of the longer blade 124 are received between the guide elements 62 and the springs 68 when mounting the feather clamp.

Referring to Fig. 14, the longer clamp blade 124 has a left end portion 136 which is formed so as to be offset to one side of the main body of the blade by an amount equal to the thickness of the blade. With this provision and with the provision before described of offsetting the guide elements 62 of disc 24 and disc 58 on opposite sides of the 120° spaced radial lines by an amount equal to the thickness of a clamp blade, it will be seen that the inner face of clamp blade 124 will always lie on the center line or radial fletching line whether it is in the position

shown in Fig. 14 with the short or free clamp blade 126 on the upper side thereof or if ends are switched so as to place the free clamp blade 126 on the lower side thereof.

In Fig. 15 the natural curvature of a wing feather 138 attached to an arrow shaft 48 is indicated. This natural curvature is opposite for right and left wing feathers. In order that the feather may, as a whole, be positioned so as to lie as nearly as possible on a radial line, the feather is placed between the feather clamp blades with its concave side lying against the inside face of the fixed or guided blade 124, as indicated in Fig. 16. From the foregoing, it will be seen that the clamp may be switched end for end to accommodate left or right-hand wing feathers. This arrangement refers only to straight style fletching.

In spiral style fletching, the feather clamp shown in Fig. 13 is twisted about a longitudinal axis by forming so that the lower free edges of the blades conform to the surface of the arrow shaft along the desired pitch line and so that the blades extend truly radially at all points along the pitch line. It will be apparent that in a feather clamp so formed the opposite ends of the clamp blades will lie at an angle to each other. To provide for this, the thumb screw 34 is loosened and disc 24 is rotated so as to rotate the clamp guides 62 thereon with relation to the clamp guides 62 on disc 58 an amount sufficient to accommodate the pitch of the twisted or spiral formed feather clamp. Spiral formed feather clamps are not reversible, and left and right-hand spiral formed clamps must be provided for left and right-hand wing feathers.

Referring to Figs. 1 to 3, an arrow shaft 48 is shown centered at its nock end and clamped at an intermediate point by clamp 70. For the purpose of mounting the fletching device in a horizontal position, and so that it may be rotated to consecutively bring the 120° fletching positions within convenient reach of the operator, a stand 140 is provided. The stand has upwardly formed legs 142 which are provided at their upper ends with round bottom slots 144 to receive the nock centering element 40 projecting from one end of the frame and to receive the arrow shaft 48 projecting from the other end of the frame. The stand may be provided with screw holes 145 in its base member for attachment to a work table.

In operation an arrow shaft with a nock attached at one end is placed in the frame with the nock centered in element 40 and the shaft clamped in clamp 70. The nock end centering element 40 is rotationally positioned relative to the guide elements 62 so that its inwardly diverging surfaces 50 and, consequently, the bow string slot 52 of the nock 46 are precisely perpendicular with the radial line lying adjacent one of the guide elements 62. If the fletching is to be straight style, the disc 24 is rotationally adjusted so that the three radial fletching lines on disc 24 are parallel with those on disc 58. The feathers are then placed in the clamps with the concave sides thereof against the long clamp blade 124. After applying the gluing material to the quill portion of the feathers, the clamps with the feathers therein are consecutively slipped into position with each end of the long clamp blade 124 entering between a guide element 62 and a spring 63. The end plate 10, as well as the disc 58 which is rigidly attached thereto, is provided with a slot 146 to facilitate removal of the arrow shaft after the fletching has been completed.

If the fletching is to be spiral form, the disc 24 and centering element 40 are rotationally adjusted together in either a clockwise or counterclockwise direction in an amount sufficient to accommodate the pitch of the spiral formed feather clamps, depending upon whether it is to be left or right spiral fletching. From the foregoing, it will be seen that I have provided a simple, inexpensive, and universal arrow fletching tool with which the semi-skilled operator can readily fletch arrows precisely and rapidly in the style he wishes.

It is recognized that numerous modifications of my invention will occur to those skilled in the art, and it is the intention that the foregoing description be illustrative of the principles of my invention and not limiting, the scope of my invention being set forth in the appended claims.

I claim:

1. In a multiple feather, arrow fletching jig, an elongated frame member including means mounted thereon for positioning and holding the end portion of an arrow to be fletched on the longitudinal axis of the frame, and means for slidably mounting a plurality of feather clamps in spaced angular relationship about the frame axis comprising a member at each end of said frame, each of which has formed thereon a plurality of radially extending guide surfaces angularly spaced about the frame axis, and a resilient member mounted adjacent each of said guide surfaces and having a portion thereof bearing against the adjacent guide surface.

2. In an arrow fletching jig, an elongated frame, a plurality of radial feather clamp guide elements supported at each end of said frame, which guide elements are angularly spaced about the longitudinal axis of said frame, means at one end of said frame including a wedge adapted to be received in the bow string slot at the nock end of an arrow for centering an arrow at that end on the axis of the frame, and means at the other end of the frame for clamping the arrow in a position of alignment with said frame axis irrespective of the diameter of the arrow, said means including a pair of pivoted clamping elements mounted on spaced pivots, which pivots lie on opposite sides of the longitudinal center line of the frame, and each clamping element having a portion thereof movable toward and away from an arrow placed between them for effecting the clamping or releasing respectively of the arrow, spring means biasing said clamping elements rotationally in a clamping direction, and link means connecting said clamping elements to constrain them to rotate equally in opposite directions.

3. In a multiple feather clamp fletching jig, an elongated rigid frame, a plate member at each end of said frame arranged parallel to each other and perpendicular to the longitudinal axis of the frame, a plurality of radial feather clamp guides on each plate member angularly spaced about the frame axis, a nock end centering device at one end of said frame centrally positioned in one of said plate members and mounted therein for rotational and longitudinal adjustment, said centering device including a wedge for entering the bow string slot at the nock end of an arrow, and said plate member supporting said centering device being mounted in said frame for rotational adjustment about the longitudinal axis of the frame.

4. In an arrow fletching jig, an elongated frame, means for positioning the end portion of an arrow to be fletched on the longitudinal axis of the frame, a feather clamp including a pair of elongated blades lying face to face and hinged along one edge, one of said blades being longer than the other and extending beyond the other at both ends, a radial clamp guide element at each end of said frame for receiving the extending ends of said long clamp blade, said guide elements lying along opposite sides of a radial line through the axis of said frame, and said long clamp blade being offset at one end in the plane of the blade an amount equal to the thickness of the blade, thereby to permit the clamp to be switched end for end to accommodate left or right-hand wing feathers while maintaining a fixed perpendicular relationship between one face of said long clamp blade and said radial line.

5. In an arrow fletching jig, an elongated frame, means for positioning the end portion of an arrow to be fletched on the longitudinal axis of the frame, a feather clamp mounted in said frame and arranged parallel with and extending radially from the axis of the frame, said clamp

comprising a pair of elongated blades lying face to face and hinged along one edge, one of said blades being longer than the other and projecting beyond the other at both ends, a rigid, radially extending guide surface at each end of said frame, the guide surface at one end of the frame being on one side of said long clamp blade and the guide surface on the other end of the frame being on the other side of said long clamp blade, whereby said guide surfaces are engaged by opposite sides of said long clamp blade at its projecting ends, and resilient means mounted adjacent each guide surface acting to bias that end of the clamp blade against the guide surface.

6. In an arrow fletching jig, an elongated open frame having parallel end plates rigidly joined by spaced longitudinal members, a disc member carried by each of said end plates, which disc members each lie face to face with an end plate and have centers lying on the longitudinal center line of the frame, each of said discs having formed thereon a plurality of radially extending guide surfaces, each of which is angularly spaced from the other about the disc center, and each of said discs having a plurality of formed leaf springs, one adjacent each guide surface, which leaf springs are each fixed at one end and include a straight portion lying along the adjacent guide surface, and means for mounting at least one of said discs for rotational adjustment about the frame axis.

7. A feather clamp for an arrow fletching jig comprising a pair of elongated blades lying face to face, one of said blades being longer than the other and projecting beyond the other at both ends, means for hinging said blades along one longitudinal edge, means biasing the free ends of said blades together thereby to clamp a feather placed between them, and said longer blade having its projecting portion at one end offset in the plane of the blade an amount equal to the thickness of the blade.

8. In an arrow fletching jig, an elongated frame, means at one end of the frame for centering the nock end of an arrow on the longitudinal axis of the frame, and clamping means at the other end of said frame for engaging an arrow at an intermediate point thereon so as to position the arrow in alignment with the longitudinal frame axis, irrespective of arrow diameter variations, and so as to hold the arrow against lateral, longitudinal, and rotational movement, said means including a pair of oppositely acting, spring-pressed elements each having a V-groove therein for engaging diametrically opposed sur-

faces of an arrow placed between them, guide means for guiding said elements in a path lying perpendicular to the frame axis, and link means connecting said elements to constrain them to move equally in opposite directions.

9. In an arrow fletching device, an elongated frame, an arrow centering device at one end of said frame including an element for entering the nock of an arrow thereby to fix the arrow against rotation, a feather clamp guide member supported at each end of said frame, each of which members is provided with a plurality of radially extending feather clamp guides angularly spaced about the axis of said centering device, said centering device and the feather clamp guide member adjacent thereto being mounted for independent rotational adjustment relative to said frame, and means for detachably connecting said centering device and said adjacent feather clamp guide member for joint rotation adjustment relative to said frame.

10. In a multiple feather fletching jig, an elongated open frame comprising a pair of fixed end plates connected by rigid longitudinal members, a plurality of radial feather clamp guide elements at each end of said frame supported on said fixed end plates, said radial feather clamp guide elements at each end of said frame being similarly spaced angularly about the longitudinal axis of the frame, and said feather clamp guide elements at one end of said frame being carried on a member which is mounted on the fixed end plate at that end of the frame for rotational adjustment thereon about the longitudinal axis of the frame, whereby the radial guide elements at that end of the frame may be angularly adjusted with respect to the angular guide elements at the other end of the frame in a manner to accommodate and accurately position left or right-hand spirally formed feather clamps.

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