Feb. 6, 1968 J. A. WATSON, JR 3,367,375

STAKE FORMING APPARATUS

Filed March 23, 1966 3 Sheets-Sheet 1

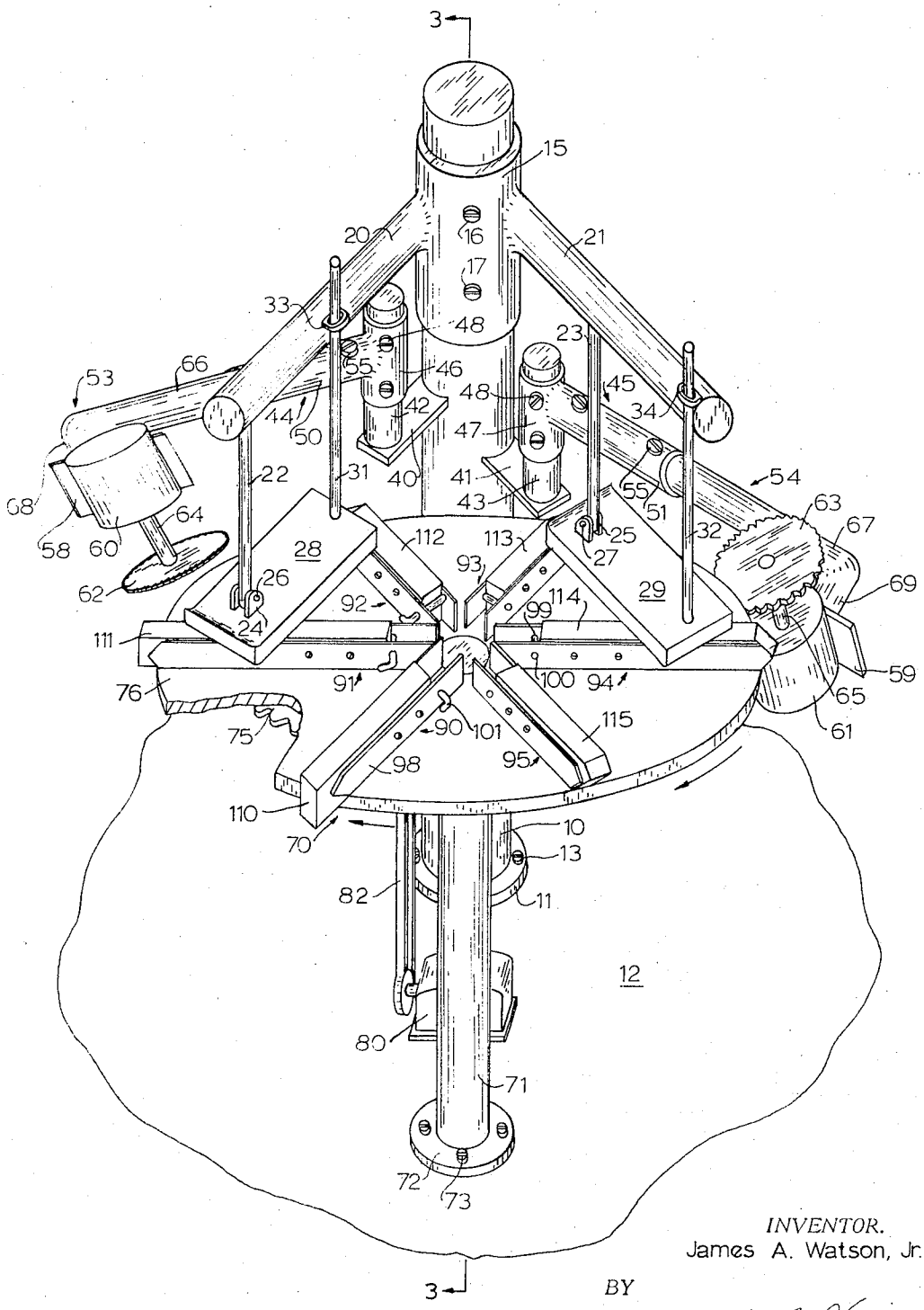


FIG-1

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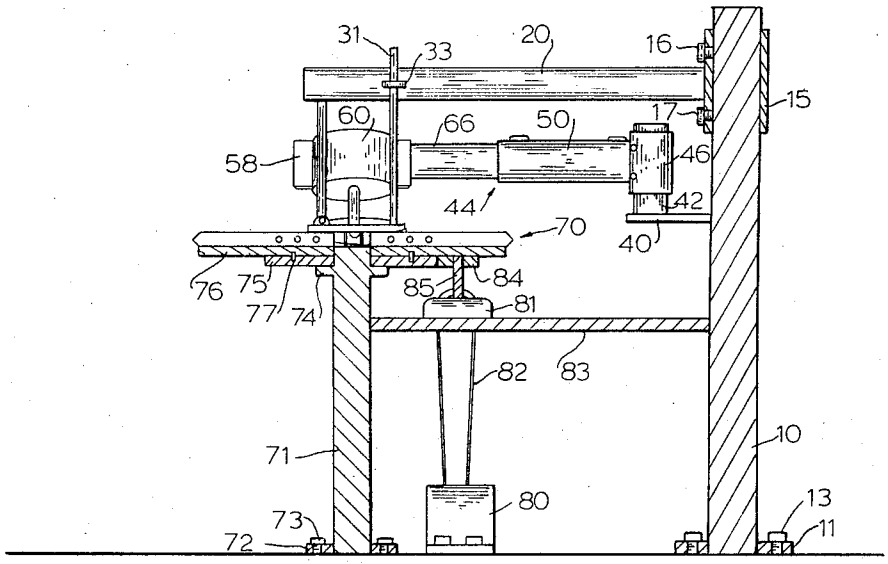
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STAKE FORMING APPARATUS

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Fig-3



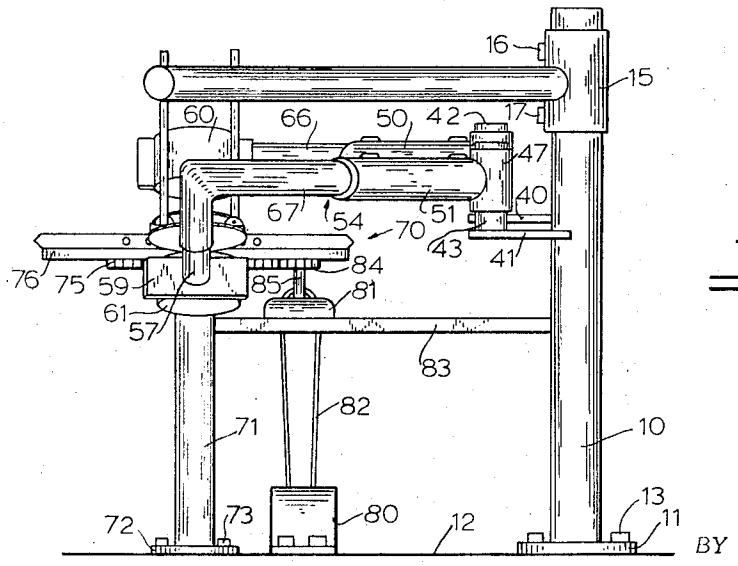


Fig-2

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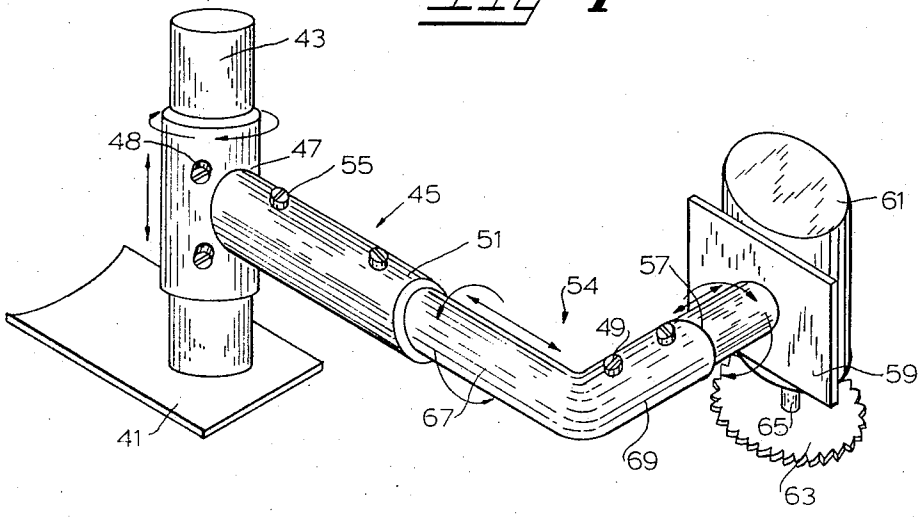
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Feb. 6, 1968 J. A. WATSON, JR 3,367,375

STAKE FORMING APPARATUS

Filed March 23, 1966 3 Sheets-Sheet 3

Fig-4



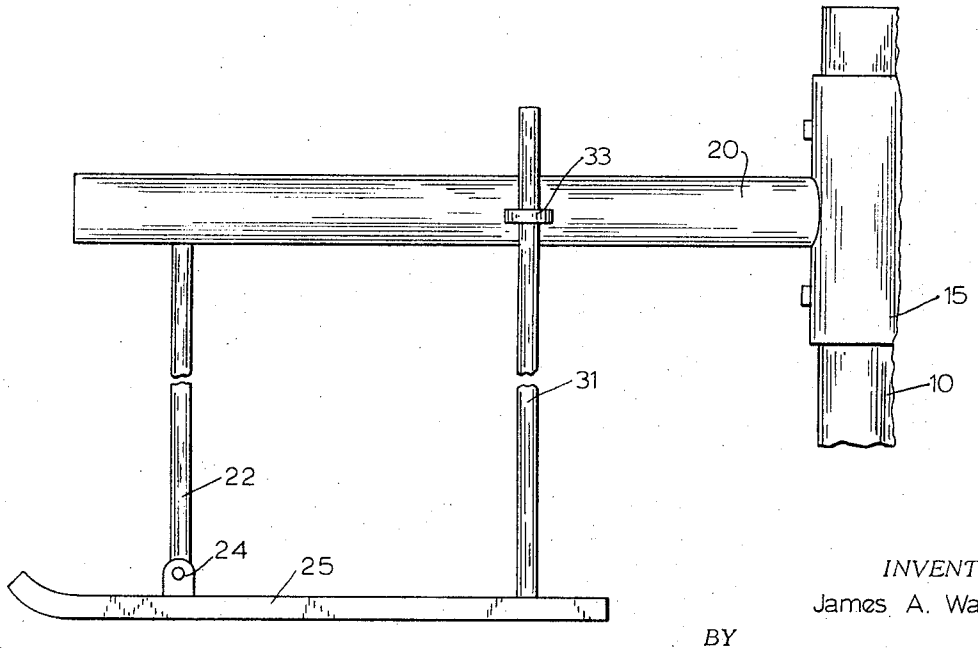


Fig-5

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STAKE FORMING APPARATUS

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4 Claims. (Cl. 143—57)

This invention relates to mill machinery and, more particularly, to machinery for forming the sharpened ends of surveyor stakes and the like.

Surveyor stakes, which are comprised of an elongated piece of wood having a sharpened ground piercing end and an impact receiving end, are in great demand due to the current rate of building roads, structures and the like. The formation of the surveyor stake's ground piercing end has to date been done manually by an operator who moves each stake blank individually past an energized saw blade. It can be seen that if the ground piercing end of the stake is to be V-shaped, which is its usual geometric arrangement, the operator must pass the stake by the saw blade twice. It is evident that this process is very time consuming and at a maximum, the operator can only produce approximately two thousand shaped stakes per work day. Also, the operator is constantly exposed to danger since his hands pass substantially close to the saw blade during each cut. Therefore, an object of this invention is to provide an automatic edge forming machine which is adapted to shape the ends of ground piercing stake blanks in quantities exceeding ten thousand stakes per work day.

Another object of this invention is to provide an automatic edge forming machine which does not require the operator to expose himself to the machine's cutting blade.

A further object of this invention is to provide a machine which automatically and continuously passes surveyor stake blanks past a plurality of cutting edges whereby a V-shaped, ground piercing end is formed.

Still another object of this invention is to provide a surveyor stake end forming machine which is adapted to handle most any length stake blank and which is adapted to provide the ground piercing end of the stake with most any desired angle of taper.

Other objects and advantages of this invention will become apparent when the following detailed description is read in conjunction with the specification, claims and appended drawings. A preferred embodiment will now be described with reference to the accompanying drawings, in which:

FIGURE 1 is a pictorial, perspective view of the invention showing the interrelationships of the various components which comprise the invention;

FIGURE 2 is an elevation view of the invention showing the driving gear mechanism which rotates the stake receiving turntable;

FIGURE 3 is an elevation sectional view taken along lines 3—3 of FIGURE 1;

FIGURE 4 is a pictorial, fragmentary, perspective view of the vertically and horizontally adjustable arm saw support; and

FIGURE 5 is an elevation view of the pivoting stake clamping plate.

One embodiment of the present invention contemplates providing a stake sharpening apparatus with a turntable which is rotatably mounted on an upwardly extending and rigidly positioned support shaft. The turntable is provided with a plurality of uniform radially extending stake holders each of which is adapted to slidably receive a stake blank. The holders are adjustable in that they are adapted to receive a stake blank of most any length and to project at one end a predetermined distance outwardly beyond the edge of the turntable and the outwardly pointing ends of the holders. The turntable is also provided with a large

axially aligned gear which is rigidly secured thereto and which is driven by an electric motor or the like through a standard gear reducing mechanism. Associated with the turntable and in cooperation therewith is a stationarily positioned support frame. The frame includes at two successive sawing stations a pair of radially and horizontally extending motor support arms which individually receive a motor. Each motor is provided with a disc shaped circular saw blade which is selectively positioned in the path traveled by the outwardly projecting ends of the stake blanks so that as the stake blanks pass by the cutting blade, a selected portion of the end of the stake is severed from the remainder. Each motor is adjustably mounted on its support arm and each support arm is adjustably mounted with respect to the stationary frame so that any desired angle of cut may be achieved by selectively moving the motor and its cutting blade into that desired position. The stationary frame is also provided with a plurality of outwardly extending clamp support arms which are horizontally positioned over the turntable. Each clamp support arm supports a clamping plate which is substantially parallel to the turntable and adjustably positioned so as to engage and hold a surveyor's stake blank in its respective holder as the stake blank passes through the cutting area.

This invention is illustrated in connection with the accompanying drawings in which the figures are illustrative of the preferred embodiment of the invention.

A cylindrical frame **10** which has an integrally connecting flange **11** circumscribing one end thereof is vertically positioned on a suitable surface **12**, such as concrete floor, and is rigidly held in that upright position by means of screws **13** which pass through flange **11** and into surface **12**. Frame **10** is generally cylindrical in shape and is provided with a slidably mounted collar **15** which may be rigidly secured to frame **10** by means of set screws **16** and **17**. Collar **15** is provided with two outwardly and rigidly extending integral arms **20** and **21** which are arranged horizontally with respect to surface **12**. Arms **20** and **21** are respectively provided with downwardly extending shafts **22** and **23** which are in parallel alignment with frame **10**. The lower ends of shafts **22** and **23** are pivotally connected to clamping plates **28** and **29** by means of clevis joints **24** and **25** which allow clamping plates **28** and **29** to freely pivot on shafts **22** and **23**. In order to maintain rigidity in the horizontal plane, clamping plates **28** and **29** are respectively provided with upwardly extending shafts **31** and **32** which are rigidly mounted thereon and which are slidably received by elongated eyelets **33** and **34**, eyelets **33** and **34** being respectively mounted on arms **20** and **21**. It is desirable to provide the forward edges of clamping plates **28** and **29** with an upwardly sloping surface as shown in FIGURE 1 so that the stake blanks which pass thereunder will not have the tendency to abut against that leading edge. Plates **28, 29** should be made heavy or weighted.

To provide support for the cutting apparatus, frame **10** is provided with integrally mounted and horizontally disposed support plates **40** and **41** which respectively receive vertically extending shafts **42** and **43** on their upper surfaces. Vertical shafts **42** and **43** respectively receive T-shaped pipe members **44** and **45** by means of tubular crossbar portions **46** and **47**. Vertical alignment of T-shaped members **44** and **45** may be obtained by slidably adjusting the crossbar **46** and **47**, respectively, on shafts **42** and **43** and securing the same in place thereon by set screws **48**. T-shaped pipe members **44** and **45** also include tubular stems **50** and **51** which are adapted to telescopingly receive the elongated arms **66** and **67** of L-shaped members **53** and **54**, respectively. The elongated arms **66** and **67** of L-shaped members **53** and **54** once adjusted in stems **50** and **51** are securely held therein by

means of set screws **55**. The short arms **68** and **69** of L-shaped members **53** and **54** slidably receive shafts **56** and **57**, respectively (shown in FIGURES 2 and 4), and are adapted to secure shafts **56** and **57** therein by tightening their respective set screws **49**. The exposed ends of shafts **56** and **57** rigidly receive perpendicularly mounted plates **58** and **59**, respectively, which in turn securely receive electric motors **60** and **61**. Electric motors **60** and **61** power disc saw blades **62** and **63**, respectively, by means of drive shafts **64** and **65**. Saw blades **62** and **63** may be adjusted into most any desired cutting plane by moving crossbars **46** and **47** vertically along shafts **42** and **43** and by pivoting the same about shafts **42** and **43**, by sliding long arms **66** and **67** of L-shaped members **53** and **54** in stems **50** and **51** and by rotating connecting shafts **56** and **57** in short arms **68** and **69**.

Turntable **70** includes an upright post **71** which is secured to surface **12** by means of a flange **72** and bolts **73**. Post **71** is also provided with an upper integral flange **74** which is adapted to support pinion gear **75**. Pinion gear **75** which is rotatably journaled on post **71** supports and is integrally locked to a table **76** by means of keys **77**. To rotate table **76**, a motor **80** is mounted on surface **12** and is connected to a gear reducer **81** by means of belt **82**. Gear reducer **81** which is mounted on bar **83** that extends between frame **10** and post **71** rotates driving gear **84** by means of shaft **85**. Drive gear **84** is in meshing engagement with pinion gear **75** and upon the energization of electric motor **80**, table **76** is rotated in a selected direction at a selected speed.

The upper surface of table **76** is provided with a plurality of stake blank holders **90**, **91**, **92**, **93**, **94** and **95** which are in radial alignment with the axis of table **76** and post **71**. Each stake blank holder such as holder **90** includes two parallel and upwardly extending elongated side members **97** and **98** which securely receive a stake blank of given size and hold the same in a selected position. While not shown, it is contemplated that a selected side member may be adjustably positioned on table **76** so as to accommodate stake blanks of various widths. Side members **97** and **98** are provided with aligned and oppositely positioned holes **99** and **100**, respectively, and each pair of opposed holes are adapted to adjustably position a pin **101** which adapts each stake holder to receive a stake blank and position the same for cutting so that stakes of various lengths may be shaped and cut. That is, one end of each stake blank abuts the pin **101** and the amount the opposite end of the blank projects beyond its holder is determined by the location of pin **101**.

In operation, stake blank holders **90**, **91**, **92**, **93**, **94** and **95** are respectively provided with stake blanks **110**, **111**, **112**, **113**, **114** and **115**. One end of each stake blank will be shaped in the form of a V by cutting along one plane and alternatively cutting along a second converging plane; therefore, in order to provide each stake blank with a V having the proper angle between its converging surface edges, saw blades **62** and **63** must be tilted at the proper angle in the blank's path of travel. This positioning is achieved by moving crossbars **46** and **47** vertically along shafts **42** and **43** and horizontally by pivoting the same about shafts **42** and **43** and substantially simultaneously therewith moving long arms **66** and **67** in stems **50** and **51** until blades **62** and **63** are properly positioned in the path of travel of the ends of the respective blanks. The angle of pitch or the angle between the converging edges of the stake blank is controlled by rotating long arms **66** and **67** about its axis in stems **50** and **51**. Lastly, the lead of the respective saw blades is adjusted by rotating shafts **56** and **57** in the short arms **68** and **69** of L-shaped members **53** and **54**, respectively. The proper lead is important for the blades must be tilted so that the rear portions thereof clear the stake after the same has passed by the forward cutting edge. The structure of the invention lends itself particularly well to this requirement.

After the saw blades **62** and **63** have been properly positioned in the path of the stake blanks, table **76** is energized in a clockwise direction by motor **80** through the linkages as previously described. In reference to the static situation as shown by FIGURE 1, stake **110** is inserted into holder **90** so that it firmly rests against pin **101**. Stake **111** has advanced into the area beneath plate **28** and is firmly held in holder **91** thereby as it advances beneath the same towards saw blade **62**. Stake blank **112** which resides in holder **92** has advanced past saw blade **62** and has had a portion thereof removed by saw blade **62** thereby forming one edge of the V-shaped ground piercing end. Stake blank **113** which resides in holder **93** and which has passed by saw **62** is in a position to slide under plate **29** and be firmly secured in the holder **93** as stake blank **113** passes by saw **63**. Blank **114** which, at the position shown, still partially resides under plate **29** thus holding it firmly in holder **94** has passed by saw **63** which forms the second edge of the V-shaped ground piercing end. Stake blank **115** which is free of plate **29** is adapted to be removed from stake holder **95** manually. By slidably engaging the blanks immediately behind their respective projecting ends as illustrated in the drawings, the blanks are effectively secured as they pass through the successive sawing stations.

It can be seen that for each revolution of table **76**, six surveyor stake blanks may be trimmed and provided with V-shaped ground piercing ends. Table **76** may be provided with any desirable number of stake holders and it may also be rotated at any given speed so as to adjust to the individual working speeds of the laborer. It has been found that the particular arrangement as shown and described has the desired rotating speed of three and one-half revolutions per minute thus adapting this apparatus to form the ground piercing ends at a rate of approximately twenty-one stakes per minute or over ten thousand per work day. The operator can conveniently both remove the finished stakes as well as load the blanks at the station between the two sawing stations and actual experience shows that this can be accomplished at the rate indicated. Furthermore, set up time for changing the length of stake is reduced to a minimum.

While the preferred embodiment of the invention has been disclosed, it is to be understood that changes and variations may be made without departing from the spirit and scope of the invention except as defined by the appended claims.

I claim:

1. An apparatus for automatically making two successive converging cuts on one end of each of a plurality of uniform size stake blanks so as to provide points therefor, comprising:

(a) a plurality of uniform work holders residing on a common horizontal plane and extending radially from and rotatable around a common vertical axis, each said work holder having an open top and including a pair of opposed side members, a bottom member and an end member, each said holder being adapted to support one of said blanks between said sides such that one end thereof abuts said end member and the other end projects some predetermined distance outwardly beyond the outer ends of said side members;

(b) means mounting said work holders including means for continuously rotating said holders past first and second successive spaced peripheral sawing stations and a third loading-unloading station located intermediate said first and second stations;

(c) first and second circular disc saws respectively angularly mounted at said first and second stations including motors therefor and arranged to cut the said projecting end of each successive blank passing thereby in two successive cuts along selected planes which converge and provide a point for the said projecting end of each said blank; and

(d) hold down means located at each of said first and second stations for slidably engaging and pressing each said blank against the respective bottom member of its holder as the same passes each said respective station.

2. The apparatus of claim 1 including a vertical tubular base member, a pair of adjusting arms mounted on and extending outwardly from said base member and mounting on the respective outward ends thereof a respective one of said motors, said adjusting arms each including a T-shaped tubular member having a vertical crossbar portion adjustably mounted to slide vertically and parallel to the axis of said base member and a horizontal stem portion, an L-shaped tubular member on each said arm having a long leg and a short leg, said long leg being adjustably mounted to slide on and around the axis of said stem portion, and on each said short leg a tubular shaft rigidly mounting the respective said motor, said shaft being adjustably mounted to slide on and around the axis of said short leg.

3. The apparatus of claim 2 wherein said each said pair of opposed slide members include opposed and axially aligned pairs of spaced apart holes and a pin for each pair of opposed side members, said pin being adapted

to reside in any selected pair of holes and to have a stake blank abut thereagainst thereby making said end member adjustable to accommodate to blanks of varying length.

4. The apparatus of claim 3 wherein said hold down means comprise a pair of substantially flat plates residing in a horizontal plane above and substantially parallel with the plane of said holders and having bottom surfaces adapted to slidably engage and hold said blanks immediately behind the projecting ends thereof and arm means mounting said hold down means on said base member and being adapted to adjustable, vertical and radial positioning thereof thereby allowing both the working angle and pressure asserted by said hold down means with respect to said blanks to be adjusted.

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