United States Patent [19]

Warren

[11] **3,765,325**

[45] **Oct. 16, 1973**

[54] **APPARATUS FOR MARKING A MOVING ELONGATED WORKPIECE**

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[73] Assignee: **United States Steel Corporation,** Pittsburgh, Pa.

[22] Filed: **Jan. 19, 1972**

[21] Appl. No.: **219,061**

[52] **U.S. Cl.** **101/6,** 101/36

[51] **Int. Cl.** **B41f 17/10,** B41f 17/20

[58] **Field of Search** 101/5, 6, 8, 11, 101/35–37

[56] **References Cited**

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Assistant Examiner—Clifford D. Crowder
Attorney—Ralph H. Dougherty

[57] **ABSTRACT**

Apparatus for marking an elongated workpiece comprising a marking wheel rotatably mounted in a yoke which is movable against the workpiece as the workpiece is moving, is mounted for horizontal adjustment, vertical adjustment, and arcuate or angular adjustment on a curved way in a plane normal to the path of travel of the workpiece. The marking wheel may contain die stamps or ink stamps. The apparatus continuously marks structural shapes, bars, rounds, etc., or flat product in either a hot or cold process.

13 Claims, 5 Drawing Figures

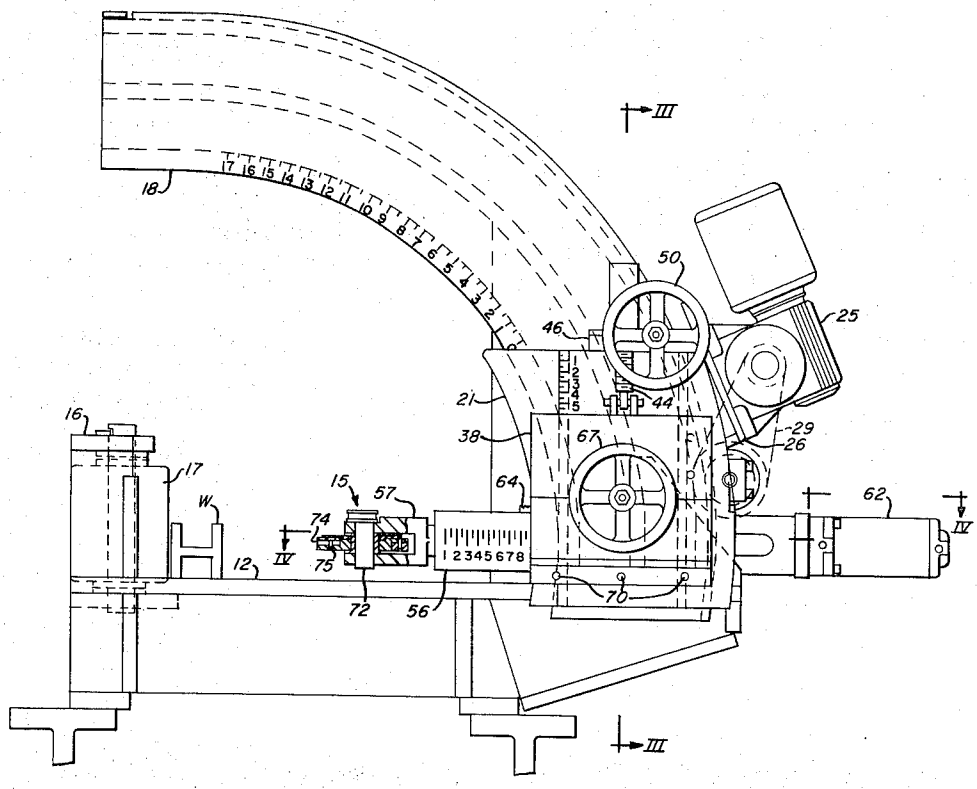


FIG. 1

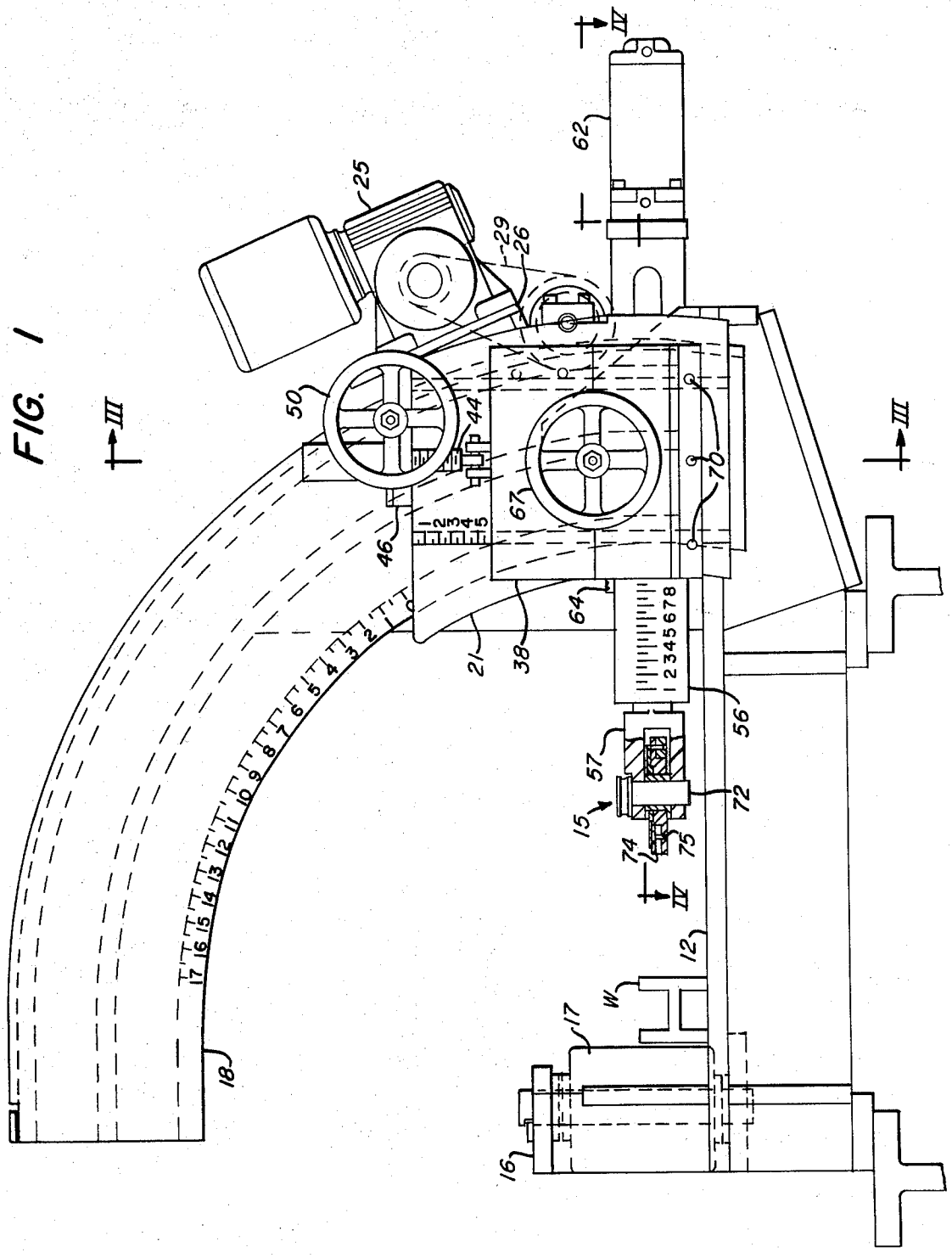

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FIG. 2

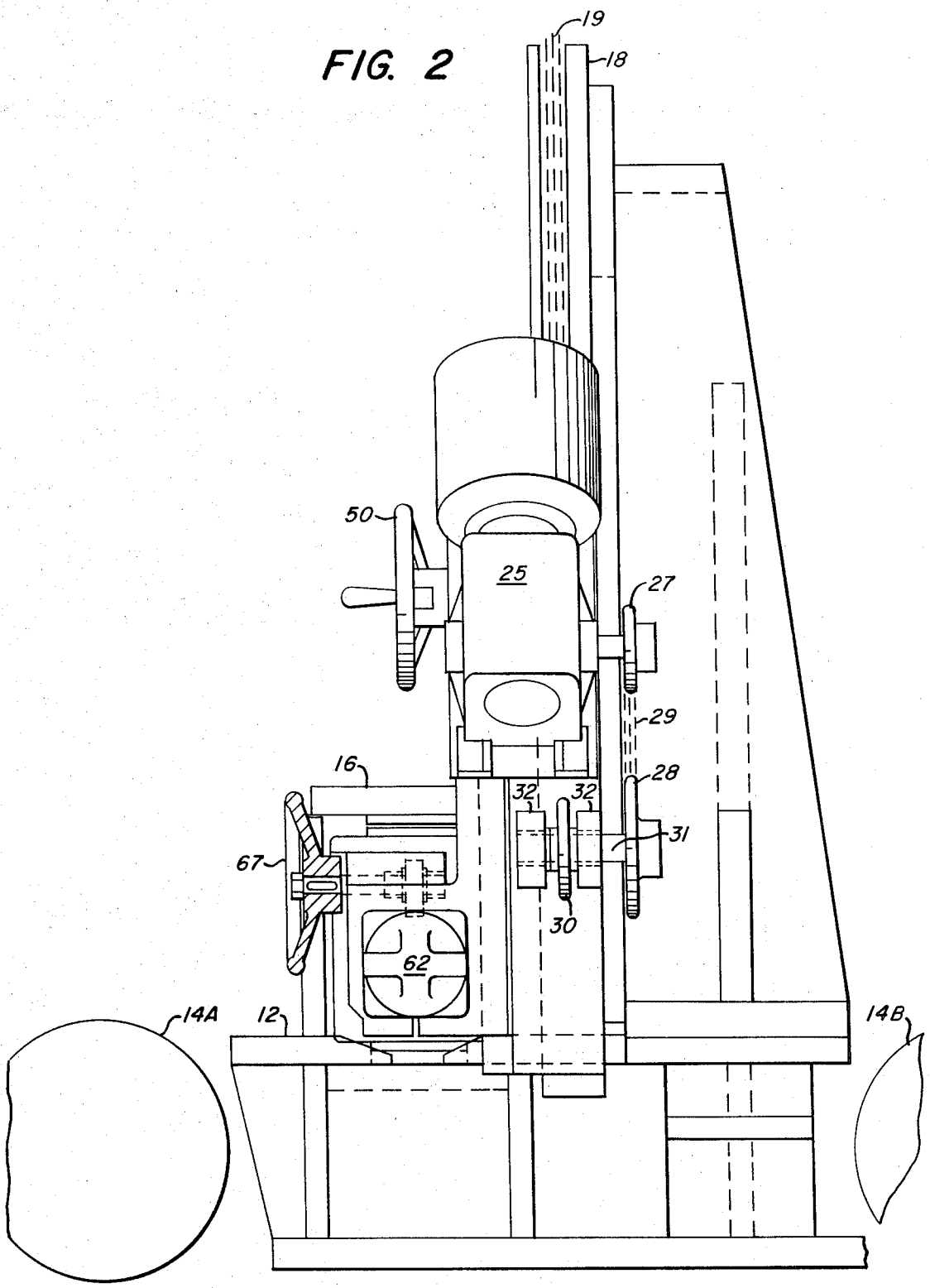


FIG. 3

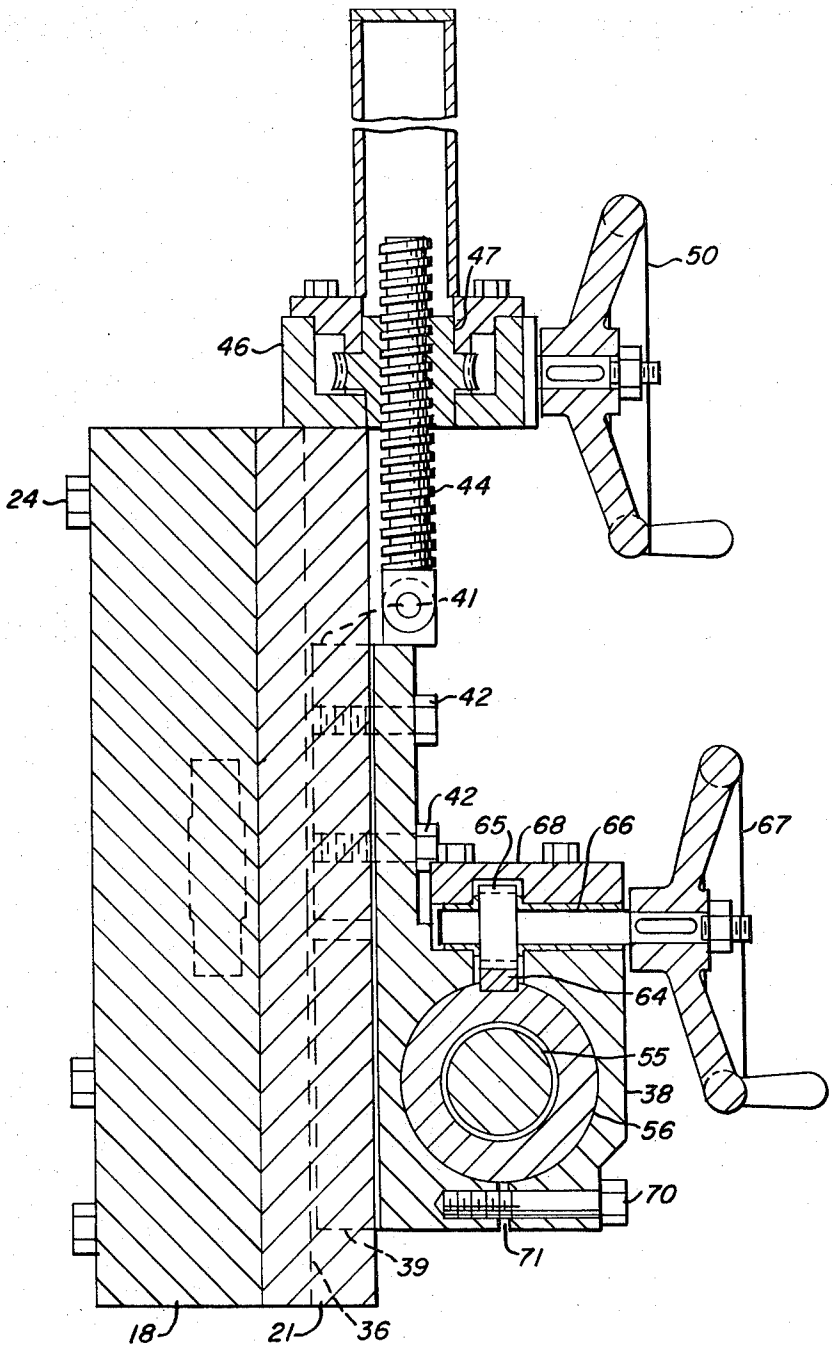


FIG. 5

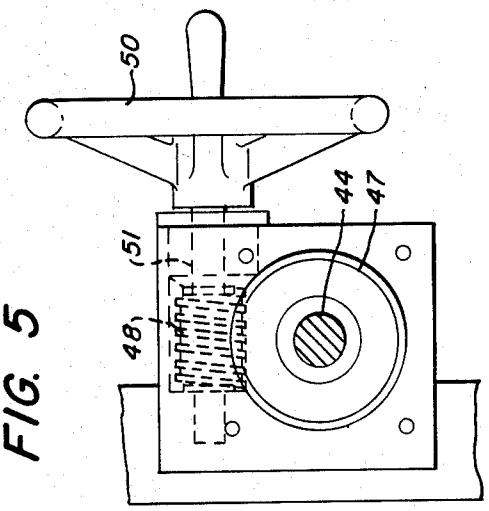

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FIG. 4

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APPARATUS FOR MARKING A MOVING ELONGATED WORKPIECE

In the manufacture of structural steel shapes such as angles, channels, bars, and rounds, it is frequently necessary to continuously mark the grade of steel or some other indicia on the entire length of the product. This is normally done either in the finishing stand of a structural mill or as the workpiece passes along a runout table between the mill and subsequent processing equipment. Presently available marking apparatus requires an excessive length of time to adjust the marking apparatus for a change in product width, product height, or type of product, which may include a change in the angle of approach of the marking head. All of the three aforementioned adjustments require the use of an overhead traveling crane and several employees to reposition the apparatus to the proper setting.

It is the principal object of my invention to provide an apparatus for continuously marking a structural mill product of any size or shape which apparatus can be quickly adjusted by one man to cause the marking head to contact the surface of the workpiece in a plane normal to such surface.

This and other objects will become more apparent by reference to the following detailed specification and the appended drawings in which:

FIG. 1 is a side elevational view of the marking apparatus showing the marking head in a horizontal position;

FIG. 2 is an end view from the right side of FIG. 1;

FIG. 3 is a vertical sectional view taken along line III—III of FIG. 1;

FIG. 4 is a horizontal, sectional view taken along line IV—IV of FIG. 1; and

FIG. 5 is a top plan view of a portion of the apparatus shown in FIG. 3.

As shown in FIGS. 1 and 2, the invented apparatus is mounted adjacent a roller table upon which an elongated structural shape is conveyed. A support or apron 12, located between adjacent table rollers 14A and 14B of the roller table as shown in FIG. 2, supports at one end a marking assembly 15 and at the other end, a vertical guide roll housing 16 in which a vertical idler guide roll 17 is journaled. An arcuate adjusting slide support 18 is fixed to the apron 12 and carries a roller chain 19 in a groove 20 on its outer periphery. Arcuate adjusting slide 21 engages the arcuate adjusting slide support 18 as shown in FIG. 4 and is retained in position by bearing plates 22 and 23 which are held against adjusting slide 21 and cause to bear on support 18 by bolts 24. A drive motor 25 mounted on plate 26 which is attached to adjusting slide 21 carries a sprocket 27 which is connected to sprocket 28 by drive chain 29. Sprocket 28 and sprocket 30 are mounted on shaft 31 which is journaled in bearings 32. Sprocket 30 engages roller chain 19 for movement of the assembly arcuately on slide support 18. Adjusting slide 21 also carries a dovetail slide 36 (FIG. 4). Ram housing 38 has a dovetail groove 39 for engagement with dovetail slide 36 of the adjusting slide 21. A clamp 41, having a tapered edge, replaces a portion of housing 38 as shown in FIG. 3 and is connected to housing 38 by bolts 42. The tapered edge of this clamp which forms a portion of groove 39 bears against dovetail 36 when the bolts 42 are tightened to prevent vertical movement of the marking apparatus.

Affixed to the top of housing 38 is an adjusting screw 44 which projects upwardly into a worm gear box 46. The worm gear box is fixed to the top of adjusting slide 21. A worm gear nut 47 housed in the worm gear box is threadedly engaged with adjusting screw 44 and is also engaged by worm gear 48 which is affixed to hand wheel 50 through shaft 51.

Ram housing 38 carries a marking assembly 52. The housing 38 is bored and slotted to receive stamping ram 54. The stamping ram comprises a stamping arm 55 housing in a sleeve 56, the arm having a yoke 57 at one end and being connected by a clevis 59 and pin 60 to a pneumatic cylinder 62 at its opposite end. A rack 64 is fixed to the sleee 56. Pinnion gear 65, which has an associated shaft 66 connecting it to hand wheel 67, is also housed in ram housing 38 and is retained therein by bearing cap 68. Clamping bolts 70 are inserted across slot 71 beneath the stamping ram.

Yoke 57 carries axle 72 on which is journaled a stamping wheel 73. As shown in FIG. 1, the wheel contains a number of die stamps 74 for marking metal. These stamps are retained in the wheel on rotation thereof by retaining pins 75.

In operation the stamping ram head or wheel 73 contains a number of metal stamps 74 or ink marking stamps or any other suitable marking device. A heat detector, not shown, on the down stream side of the stamping apparatus detects the presence of a hot workpiece W. This causes a solenoid, not shown, to actuate the air cylinder 62 moving the stamping wheel 73 into contact with the moving workpiece. All force on the stamping ram is directed toward the center line of vertical roll 17, therefore sufficient pressure is established to create an indented mark on the workpiece. The drawings show the staming ram in the horizontal position such as would be used for marking channels or beams. If, however, angles, Z bars, bulb angles, or rails are to be marked similarly, the stamping ram must be inclined to create a sharp and readily distinguishable mark. To raise the apparatus along the arcuate adjusting slide 16, bolts 24 are loosened. Reversible drive motor 25 is then actuated turning sprockets 27, 28, and 30. Sprocket 30 engages roller chain 19 causing the apparatus to climb arcuate adjusting slide support 18. Since the motor has a reversible drive, the apparatus can be accurately arcuately positioned. Bolts 24 are tightened to assure that there is no arcuate movement after the proper position has been reached.

In order to adjust the height of the apparatus, bolts 42 are loosened and hand wheel 50 is rotated causing worm gear 48 to engage worm nut 47 raising or lowering adjusting screw 44 within the worm gear nut. As the ram housing 38 is connected to the adjusting screw it is raised at the same time. When the ram is at the proper height, bolts 42 are tightened to cause clamp 41 to lock against dovetails 36.

If the product width is such that the ram hits too hard or not sufficiently hard or fails to contact the workpiece, horizontal adjustment must be made. Bolts 70 are loosened and hand wheel 67 rotated to turn worm gear 65, moving sleeve 56 forward or backward through rack 64 to the desired location.

It can be readily seen from the foregoing that I have invented a stamping apparatus for continuously marking a moving workpiece which is horizontally, vertically and angularly adjustable. This apparatus has the capa-

bility of marking any rolled or extruded structural shape regardless of its configuration.

I claim:

1. Apparatus for marking a moving workpiece comprising;

a base,

an arcuate support frame fixed to said base,

a marking assembly having a marking head,

an arcuately movable member slidably engaging and movable along said curved support frame,

drive means connected to said arcuate adjusting means and engagable with said support frame for moving said marking assembly peripherally along said frame,

an assembly housing releasably engaging said arcuate adjusting means for carrying said marking assembly,

radial adjusting means housed in said assembly housing and engagable with said marking assembly for adjusting said marking assembly radially,

vertical adjusting means attached to said arcuate adjusting means and to said assembly housing for moving said assembly housing vertically with respect to said arcuate adjusting means, and

marking head actuating means connected to said marking assembly and to said marking assembly housing for moving said marking head into contact with said workpiece.

2. Apparatus according to claim **1** further comprising a vertical roll assembly having a vertical roll therein fixed to said base remote from said marking assembly, whereby a moving workpiece contacts said vertical roll and provides lateral support for said workpiece whenever said marking assembly is in contact with said workpiece.

3. Apparatus according to claim **1** wherein said arcuate support frame has gear means on its outer periphery.

4. Apparatus according to claim **3** wherein said drive means comprises a motor fixedly mounted with respect to said arcuately movable member, and associated gear means engagable with said gear means on said support frame.

5. Apparatus according to claim **1** wherein said marking assembly comprises a sleeve having a rack fixed longitudinally thereto, an arm slidable within said sleeve, said arm having means for carrying a rotatable marking wheel at one end thereof and means for connecting said arm to a piston rod at its opposite end, and a rotatable marking wheel journaled in said carrying means.

6. Apparatus according to claim **5** wherein said penultimate means is a yoke.

7. Apparatus according to claim **1** wherein said arcuately movable member is adapted for vertical sliding engagement with said assembly housing, and has clamping means releasably attached to said member which bears against said support frame to prevent movement therealong.

8. Apparatus according to claim **1** wherein said assembly housing is adapted for vertical sliding engagement with said arcuately movable member and has clamping means releasably attaching said assembly housing to said arcuately movable member.

9. Apparatus according to claim **8** wherein said sliding engagement is effected by a dovetail tongue mated in a dovetail groove, and said clamping means bears against said dovetail tongue.

10. Apparatus according to claim **8** further comprising clamping means to releasably hold said marking assembly in fixed relation to said housing.

11. Apparatus according to claim **1** wherein said radial adjusting means comprises a pinion gear engagable with said marking assembly and having means associated therewith for turning said gear.

12. Apparatus according to claim **1** wherein said vertical adjusting means comprises an adjusting screw attached to one of said arcuately movable member and said assembly housing, said screw threadedly engaging a worm gear nut housed in a worm gear nut housing fixed to the other of said arcuately movable member and said assembly housing, and a worm gear threadedly engaging said worm gear nut, said worm gear having means associated therewith for turning said worm gear.

13. Apparatus according to claim **1** wherein said marking head actuating means comprises a pneumatic cylinder having a piston rod attached to said marking assembly.

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