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## PIPE MARKER

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1 Claim. (Cl. 33—21)

This invention relates to improvements in pipe marking devices, and more particularly, but not by way of limitation, to an improved device for saddle marking pipes which are to be joined at unusual angles by welding.

In many flow distribution systems, particularly in the oil industry, several distribution lines must interconnect to a larger header, and frequently the connection must be made at an oblique angle. These connections are commonly known as "saddle" connections. When the welder prepares for making these connections, he must mark both the header and the end of the smaller distribution line in order to know what portions of each pipe he must cut-away to obtain a proper connection for welding. At the present time, the welder must make numerous time consuming calculations to obtain the proper cuts, and frequently uses a trial and error method until the pipes fit correctly. As a result, only very skilled welders can make acceptable saddle cuts.

The present invention contemplates a novel, yet simple, marking device for marking both the side of the header and the end of a distribution line for obtaining substantially any desired connection. After the type of connection has been determined, the apparatus is mounted on the top of either pipe; adjusted for correlating the curvature of the pipes and then swung by hand to obtain the marking along which the welder must cut. At each setting, the apparatus can be used to mark at least halfway around a pipe, and when being used on the larger of two pipes, only one setting is frequently required. No hand tools are required to operate my apparatus, except those ordinarily carried by a welder.

An important object of this invention is to facilitate and reduce the time required in making saddle cuts on pipe lines.

Another object of this invention is to provide a novel pipe marking device for marking pipes which must be connected at oblique angles.

Another object of this invention is to provide a novel pipe marking device requiring a minimum of calculations for using the device, as well as the minimum number of tools for use in connection with the device.

A further object of this invention is to make it possible for the normally skilled welder to make acceptable and exact saddle cuts.

Another object of this invention is to provide a novel pipe marking device requiring the minimum of adjustments.

A still further object of this invention is to provide a simple constructed pipe marking device having a long service life and which may be economically manufactured.

Other objects and advantages of the invention will be evident from the following detailed description, read in conjunction with the accompanying drawings, which illustrate my invention.

In the drawings:

Figure 1 is a perspective view of my novel pipe

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marking device shown in operating position on a pipe.

Figure 2 is a detailed sectional view through one adjusting portion of the device.

Figure 3 is another detailed sectional view of the pivotal portion of the device.

Figure 4 is still another detailed sectional view of a portion of the device.

Figure 5 is a plan view of a typical completed saddle connection of a small pipe on a larger pipe.

Referring to the drawings in detail, and particularly Figure 1, reference character 6 generally designates my novel pipe marking device, comprising a centering member 8. The member 8 may be of any desired cross-sectional configuration, such as the channel shown in the drawings, in order that it may be mounted on the crown of a pipe 10 along the center line of the pipe. Also, a chain or the like (not shown) is preferably provided to clamp the member 8 on the pipe 10 and prevent movement of the device 6 during the marking operation, as will be more fully hereinafter described.

A support arm 12 extends into the outer end of the centering member 8 and is adjustably secured in the member 8 by a pair of suitable screws or bolts 14. Several threaded apertures (not shown) are preferably provided along the top of the arm 12 in longitudinally spaced relation to receive the screws 14 and permit longitudinal adjustment of the arm 12 with respect to the member 8, whereby the outer end 16 of the arm 12 may be positioned a substantial distance from the end 18 of the pipe 10. Since the arm 12 is aligned with and secured to the member 8, it may be considered merely as an extension of the member 8. As shown in Figure 2, an aperture 20 is formed vertically through the outer end 16 of the arm 12 to slidably receive a bolt 22. The upper end of the bolt 22 is welded in a washer 24 and a nut 26 is secured on the lower end of the bolt. Therefore, the washer 24 may be rotated at any desired angle on the arm 12 and held in any desired position by tightening the nut 26. As indicated in Figure 1, degree markings 28 are inscribed on the upper surface of the washer 24 in the manner of a protractor, and a center mark 30 is provided on the upper surface of the arm 12 to facilitate adjustment of the washer 24 as will be hereinafter described.

A tubular sleeve 32 (Figures 1 and 2) is welded on the top of the washer 24 to slidably receive an angular positioning arm 34. The sleeve 32 and arm 34 are preferably made square in cross-section to prevent rotation of the arm 34 in the sleeve 32, and a suitable set screw 36 is threaded in the top of the sleeve 32 to secure the arm 34 against longitudinal movement. The arm 34 extends substantially transversely with respect to the pipe 10 and has a similar sleeve 38 rigidly secured on the outer end 40 thereof. As shown in Figure 1, the sleeve 38 opens in a vertical direction and slidably receives another arm 42 (sometimes hereinafter called the vertical adjustment arm) therein. A set screw 44 is threaded into one wall of the sleeve 38 to adjustably secure the arm 42.

The arm 42 extends downward from the sleeve 38 a predetermined distance, as will be hereinafter described, and has a washer 46 (see Figure 3) welded on the lower end thereof. A bolt or shaft 48 slidably extends through the washer 46 and has a mating washer 50 rigidly secured on the outer end thereof by welding. The opposite end of the bolt 48 receives a tension adjusting nut 52 and a jam or lock nut 54. It will be apparent that the position of the nut 52 determines the pressure of the washer 50 on the washer 46, and that the jam nut 54 retains the tension nut 52 in the desired position. Therefore, the force required for turning the washer 50 on the washer 46 may be adjusted as desired. It will also be observed that the shaft 48 extends in the same direction as the arm

34 to pivot the washer 50 on an axis parallel with the arm 34.

Another sleeve 56, similar to the sleeves 32 and 38, is welded to the outer face of the washer 50 to slidably receive another arm 58. The arm 58 (sometimes hereinafter referred to as the swinging arm) extends generally in the same direction as the arm 12, and is secured in the sleeve 56 by still another set screw 60. A tubular sleeve 62 (Figures 1 and 4) is rigidly secured on the outer end 64 of the arm 58 and extends at right angles to the arm 58. The sleeve 62 may be circular in cross-section to slidably receive a cylindrical chalk arm 66. However, the chalk arm 66 should be slotted as shown in Figure 4 to receive a key 68 extending inwardly from the sleeve 62 to prevent rotation of the arm 66 in the sleeve 62, yet provide a substantially unrestricted longitudinal movement of the arm 66.

The inner end of the arm 66 has a suitable chalk holder 70 secured thereon to receive and carry a piece of chalk 72 for marking the pipe 10. Also, of course, the arm 66 should be of a length to place the chalk 72 into contact with the pipe 10 in any position of the sleeve 62 opposite the pipe 10.

#### Operation

Assuming it is desired to saddle the pipe 10 onto a larger pipe 80 at an oblique angle, as shown in Figure 5, with the tops of the pipes 10 and 80 on a level, the pipe 10 is first supported in a position, preferably horizontally, where the end 18 is accessible to the welder. The top or crown of the pipe 10 is then determined, and the centering member 8 is secured on the pipe 10 in alignment with the crown. The position of the arm 12 is adjusted to position the end 16 thereof from the end 18 of the pipe 10 a distance slightly less than the radius of the larger pipe 80.

The arm 34 is then positioned at an angle to align the arm 34 parallel with the proposed center line of the large pipe 80. Since the angle at which the pipe 10 is to intersect the pipe 80 is known, the washer 24 is turned on the arm 12 until the desired angular marking 28 is aligned with the center mark 30 on the arm 12. The nut 26 may then be tightened to secure the arm 34 against further pivotal movement with respect to the arm 12 and pipe 10. It will be apparent that the center mark 30 will be aligned with the center line of the pipe 10. The arm 34 is extended from the sleeve 32 a sufficient distance to position the sleeve 38 beyond the edge of the pipe 10 to permit swinging or pivoting of the arm 58 as will be hereinafter described.

Upon securing the arm 34 in the desired angular position, the arm 42 is extended below the sleeve 38 a sufficient distance to place the bolt 48 below the crown of the pipe 10 a distance equal to the proposed distance between the top of the pipe 10 and the center line of the pipe 80 when the pipes are joined. The vertical distance from the bottom of the arm 12 to the bottom of the sleeve 38 will be known, as will the distance from the top of the pipe 10 to the center line of the pipe 80 when the pipes are joined. In fact, in the assumed example, the distance from the top of the pipe 10 to the center line of the pipe 80 will be equal to the outside radius of the pipe 80. And since the distance from the bottom of the arm 12 to the crown of the pipe 10 may be readily measured by a ruler or tape (not shown) the position of the bolt 48 may be readily obtained by a simple addition. The bottom of the sleeve 38 may be constructed on a level with the bottom of the arm 12, if desired, to further simplify the positioning of the bolt 48. In this latter example, it would be simply necessary to add the distance between bottom of the arm 12 and the top of the pipe 10 to the outside radius of the pipe 80 to obtain the desired distance from the bottom of the sleeve 38 to the center of the bolt 48. In any event, it will be observed that the bolt 48 will be aligned with the

proposed center line of the pipe 80 when the pipes are joined.

The arm 58 is then adjusted in the sleeve 56 to space the chalk 72 from the bolt 48 (measured along the arm 58) a distance equal to the outside radius of the big pipe 80. Whereupon, the tension on the bolt 48 is adjusted to prevent a free and unlimited pivoting or swinging of the arm 58, yet permit movement of the arm 58 without undue force by the welder.

The device 6 is then ready for marking around one-half the periphery of the pipe 10. The arm 58 is swung downwardly and upwardly while the arm 66 is pressed inwardly to retain the chalk 72 into contact with the pipe 10. The chalk 72 will scribe an irregular mark (not shown) on the side of the pipe 10 from the crown to the bottom of the pipe. When this mark has been made the arm 34 is removed from the sleeve 32 and inserted from the opposite direction. Also, the arm 58 is turned approximately one hundred eighty degrees on the bolt 48; whereupon, the opposite side of the pipe 10 may be marked in the same manner. Upon removal of the device 6, the welder cuts along the mark and the end 18 of the pipe 10 will fit on the surface of the pipe 80 in the desired manner as illustrated in Figure 5.

The device 6 may then be mounted on the pipe 80 to mark out an area corresponding to the inner periphery of the end 18 of the pipe 10, whereby the pipes 10 and 80 will be in communicating relation when joined. The centering member 8 is mounted on the crown of the pipe 80 (not shown) in the same manner as previously described, and the arm 34 is secured in the sleeve 32 in a position to place the arms 42 and 58 alongside the pipe 80. The angular position of the arm 34 is also adjusted to place the arm 34 parallel with the proposed center line of the pipe 10.

In the vertical adjustment of the arm 42, the center line of the bolt 48 (the pivotal axis of the arm 58) is placed in alignment with the proposed center line of the pipe 10. The distance of the bolt 48 below the sleeve 38 is obtained by measuring the distance from the top of the pipe 80 to the bottom of the arm 12 and adding this measurement to the outside radius of the small pipe 10, providing the bottom of the sleeve 38 is on a level with the bottom of the arm 12. The arm 58 is then adjusted in the sleeve 56 to position the chalk 72 from the center line of the bolt 48 (measured along the arm 58) a distance equal to the inside radius of the pipe 10.

Upon swinging the arm 58 around the bolt 48, and pressing the chalk 72 against the side of the pipe 80, the chalk will mark a design on the pipe 80 conforming to the outline of the inner periphery of the end 18 of the pipe 10, as projected on the pipe 80. The arm 58 can be revolved about the bolt 48 to obtain the complete marking of the pipe 80 in one setting of the device 6.

When the pipe 80 has been completely marked, the device 6 is removed, and the welder cuts along the marking. The pipe 10 is then placed on the side of the pipe 80 as shown in Figure 5. The end 18 of the pipe 10 will fit closely over the side of the pipe 80, and a smooth flow path will be provided from the pipe 10 into the pipe 80. The welder can then weld the end 18 of the pipe 10 to the outer surface of the pipe 80 and the desired connection will be completed.

The example described above is for what is commonly called a "saddle on" type of connection, that is, the smaller pipe 10 fits on the outside of the large pipe 80. In some instances, it is desirable to extend the small pipe 10 into the larger pipe 80, in what is known as a "saddle in" connection. In this latter event, the arm 58 is adjusted to place the chalk 72 from the center line of the bolt 48 a distance equal to the outside radius of the pipe 10, as contrasted with the inside radius of the pipe 10, when the device 6 is used on the pipe 80. The chalk 72 will then mark an outline on the surface of the pipe 80 corresponding to the outside periphery of the pipe 10.

When the pipe 80 is cut, the pipe 10 can then be inserted in the pipe 80. Also, when marking the pipe 10, the arm 58 is adjusted to make the distance between the bolt 48 and the chalk 72 equal to the inside radius of the larger pipe 80. The end 18 of the pipe 10 can then be placed flush with the inner periphery of the pipe 80, upon installation, to provide a smooth flow path through the pipe 80.

Substantially any type of saddle connection can be laid out on any two sizes of pipes with the present device. In each marking operation, the arms 42 and 58 are adjusted to correlate the sizes of the pipes to be joined, and the angular position of the arm 34 is adjusted to position the arm 34 parallel with the pipe not being cut. Also, the member 8 is mounted on the pipe to be cut along the center of the pipe and ninety degrees from the center line of the pipe which is to be joined to the pipe being cut.

From the foregoing it is apparent that the present invention will materially alleviate the problem of joining various sizes of pipes at various angles, and particularly oblique angles. The time required for marking the pipes to be cut will be substantially reduced, and the hand tools required will be maintained at a minimum. Furthermore, with my device, practically any welder can make acceptable saddle cuts, efficiently and quickly. It will also be apparent that the present device is simple in construction and may be economically manufactured.

Changes may be made in the combination and arrangement of parts as heretofore set forth in the specification and shown in the drawings, it being understood that any modification in the precise embodiment of the invention may be made within the scope of the following claim without departing from the spirit of the invention.

I claim:

A device for saddle marking a first pipe which is to be welded to a second pipe at an angle, comprising a centering member for straddling the crown of the first pipe, a first arm secured to the centering member in a direction to extend parallel with the longitudinal axis of the first pipe when the centering member straddles the crown of the first pipe, a first sleeve pivotally secured on the first arm whereby said sleeve may be positioned parallel with the proposed longitudinal axis of the second pipe, a protractor carried by said first sleeve for adjusting the position of said first sleeve with respect to said first arm, a second arm adjustably secured in said first sleeve to extend parallel with the proposed axis of the second pipe, a second sleeve rigidly secured to said second arm, a third arm adjustably secured in said second sleeve to extend at right angles from said second arm toward the proposed longitudinal axis of the second pipe, a shaft pivotally secured to said third arm on an axis parallel with the second arm for positioning in alignment with the proposed longitudinal axis of the second pipe, a third sleeve secured to said shaft in a direction at right angles to said shaft, a fourth arm adjustably secured in said third sleeve, and a chalk holder slidably secured to said fourth arm to extend parallel with said shaft.

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