July 29, 1952 J. L. BLAKE ET AL 2,604,924

PIPE BENDING AND LAYOUT TABLE

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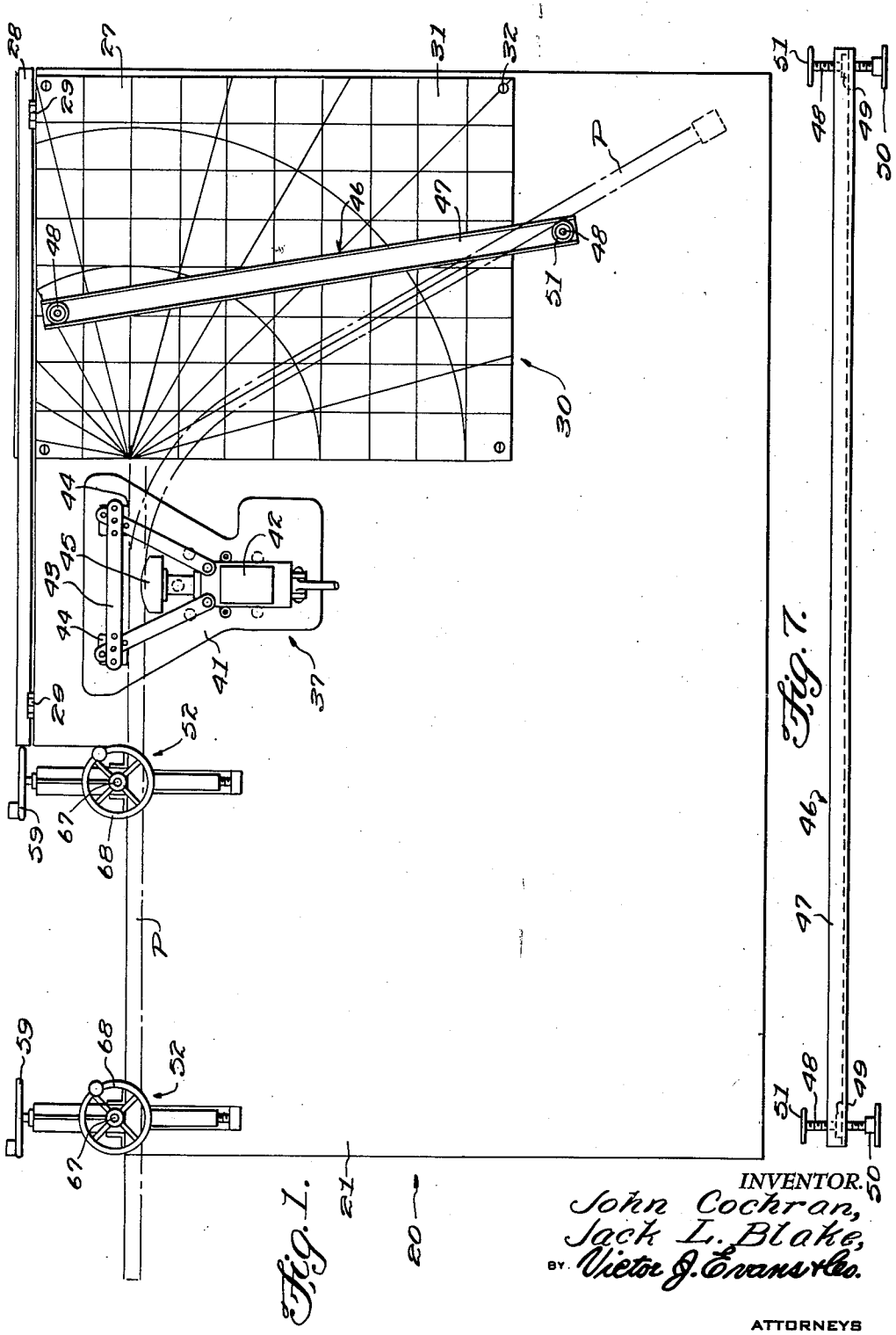


Fig. 1.

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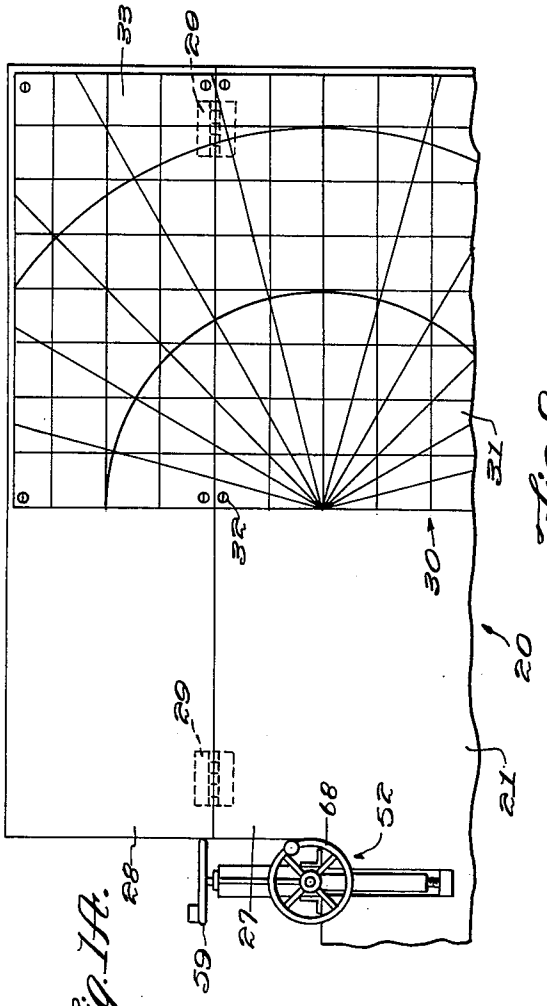


Fig. 11.

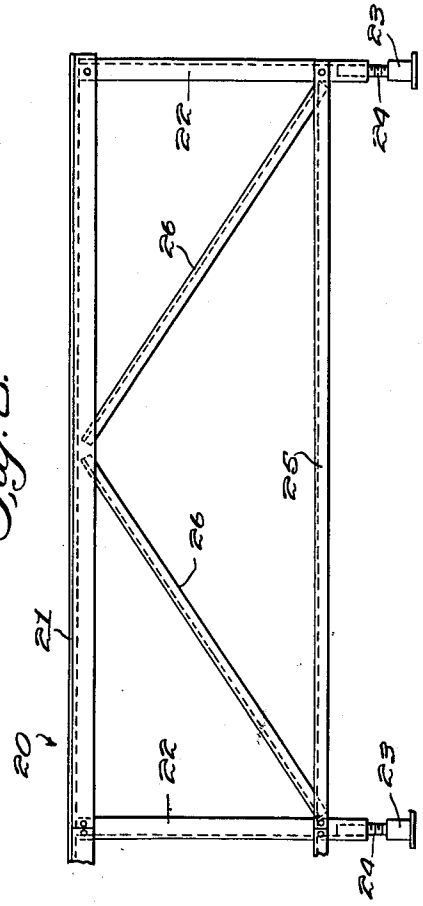


Fig. 8.

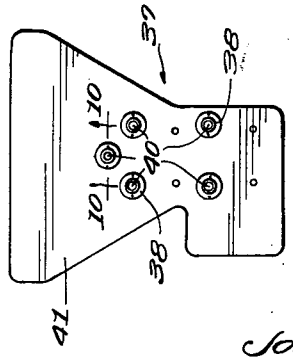


Fig. 9.

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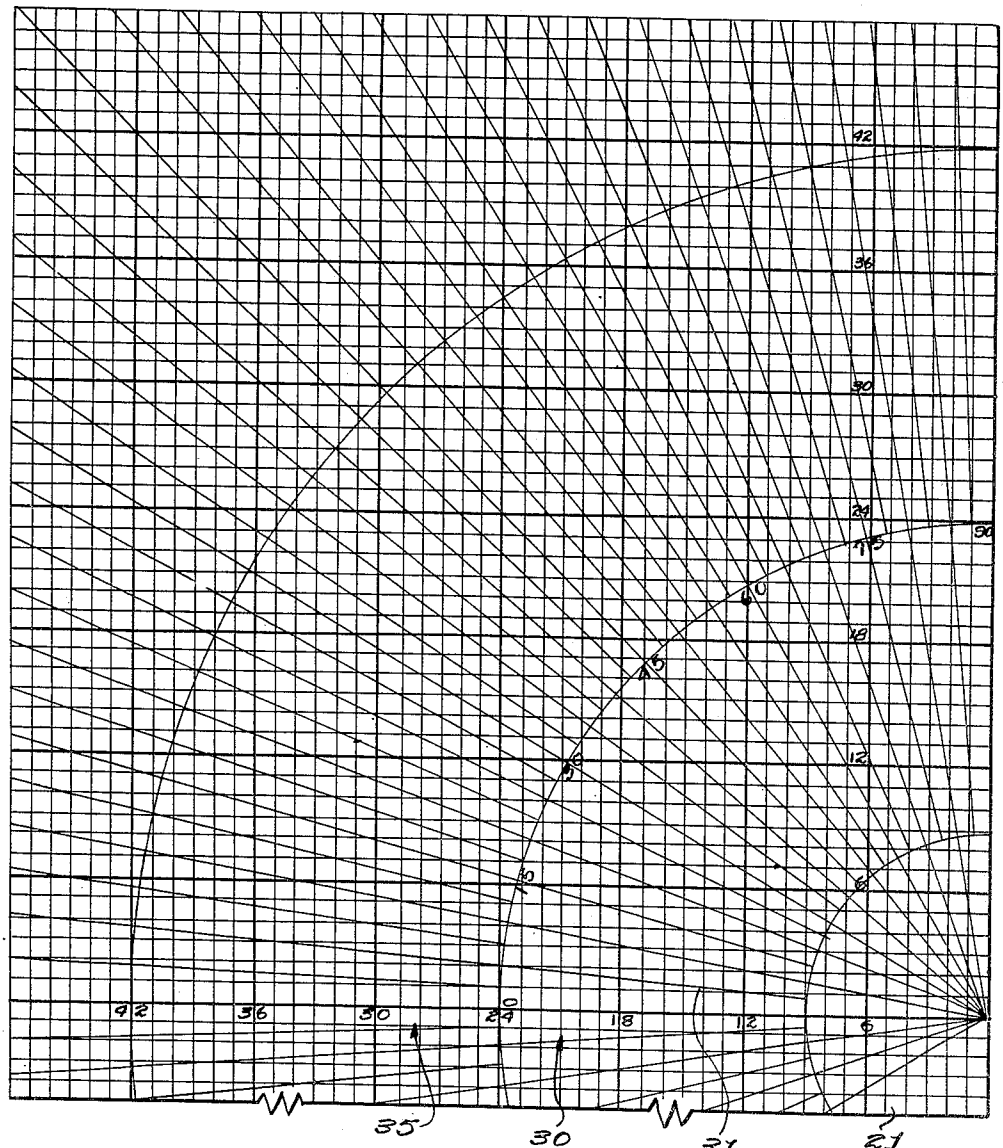
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PIPE BENDING AND LAYOUT TABLE

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Fig. 2.



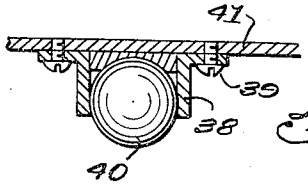


Fig. 10.

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PIPE BENDING AND LAYOUT TABLE

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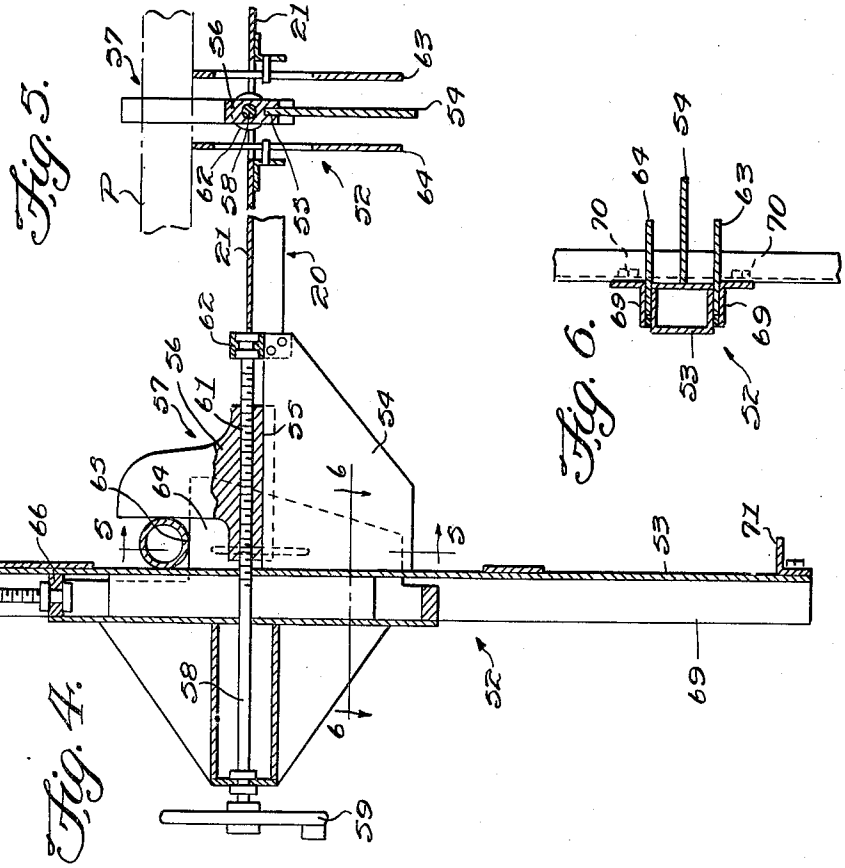


Fig. 5.

Fig. 6.

Fig. 4.

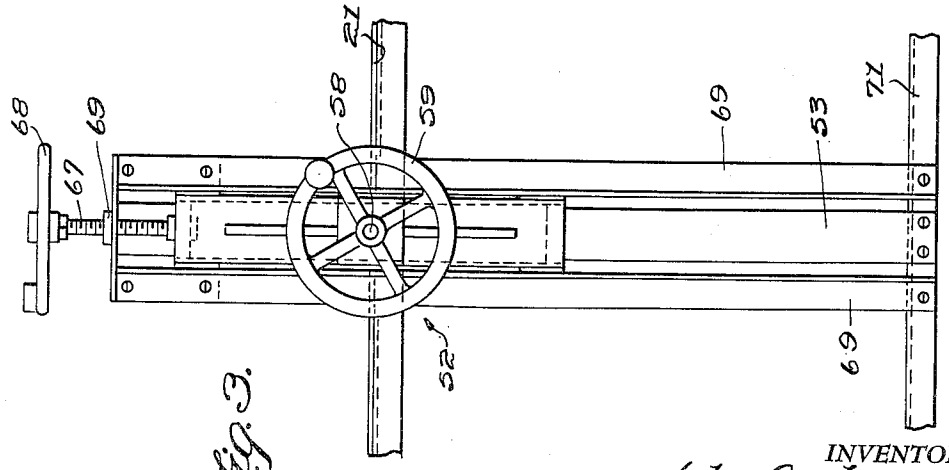


Fig. 3.

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UNITED STATES PATENT OFFICE

2,604,924

PIPE BENDING AND LAYOUT TABLE

Jack Leroy Blake and John Cochran,
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Application May 19, 1950, Serial No. 162,966

6 Claims. (Cl. 153—38)

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This invention relates to a method of and apparatus for use in bending pipes or conduits.

The object of the invention is to provide a table for supporting pipe thereon, the table having a pipe-bending mechanism movably supported thereon, whereby the pipe can be shaped to a desired curvature or configuration.

Another object of the invention is to provide a pipe-bending table which can be readily adjusted so as to insure proper alignment of the pipe and bending mechanism, the table including a graduated chart that enables the user to bend pipe to any exact angle by visual observation, as desired.

Still another object of the invention is to provide a table which has a pipe-bending mechanism movably mounted thereon, so that the user can bend pipe to a desired angle by simply and quickly moving the pipe-bending mechanism and without the necessity of moving the pipe each time it is to be bent.

Other objects and advantages of the invention will be apparent during the course of the following description.

In the accompanying drawings forming a part of this application, and in which like numerals are used throughout the same to designate like parts:

Figure 1 is a top plan view of the pipe-bending table, showing a section of pipe positioned thereon and in broken lines;

Figure 1*a* is a fragmentary top plan view of the pipe-bending table, showing the leaf or shelf raised to an operable position;

Figure 2 is an enlarged top plan view of the layout chart;

Figure 3 is an end elevational view of one of the leveling members and pipe-holding vises;

Figure 4 is a vertical sectional view taken through the member shown in Figure 3;

Figure 5 is a sectional view taken on the line 5—5 of Figure 4;

Figure 6 is a sectional view taken on the line 6—6 of Figure 4;

Figure 7 is a side elevational view of the auxiliary leveling unit;

Figure 8 is a fragmentary side elevational view of the pipe-bending table of the present invention showing the braces and adjustable leg construction;

Figure 9 is a bottom plan view of the movable mount for the conventional pipe-bending machine used on the pipe-bending table of the present invention;

Figure 10 is a sectional view taken on the line 10—10 of Figure 9.

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Referring in detail to the drawings, the numeral 20 designates a table which includes a horizontally disposed top or platform 21 that is supported by a plurality of vertically disposed, spaced, parallel legs 22. A threaded shaft 24 operatively connects a ground-engaging support member 23 to the lower end of each of the legs 22, Figure 8, so that by properly adjusting the support members 23 the user can align or level the table 20. Suitable horizontally disposed braces 25 extend between adjacent legs 22 and are secured thereto, there being inclined braces 26 extending between the table top 21 and braces 25, and the braces 25 and 26 help to steady or maintain the legs in their proper spaced relation.

Projecting from one side of the platform 21 is an extension 27, Figures 1 and 1*a*, and hingedly connected to the free longitudinal edge of the extension 27 by hinges 29 is a shelf or drop leaf 28. When the drop leaf 28 is needed or being used, it can be swung or raised from the position shown in Figure 1 to the position shown in Figure 1*a*, and any conventional locking means can be provided for releasably maintaining the drop leaf 28 in its horizontal position.

Arranged contiguous to the upper surface of the platform 21 is a calibrated layout chart 30 which enables the user to accurately ascertain the exact angle or curvature of the pipe being bent. The layout chart 30 includes a rectangular portion 31 that is secured to the platform 21 by suitable securing elements, such as screws 32, Figure 1, and a second portion 33 of the layout chart 30 is secured to the upper surface of the drop leaf 28, Figure 1*a*. The portions 33 and 31 of the layout chart 30 can be used independently or together, depending upon which way the pipe P is being bent. A portion of the layout chart 30 is shown in detail in Figure 2, and it will be seen that the chart 30 is provided with a plurality of graduations or indicia thereon. Thus, arranged on the layout chart 30 are angle markings 34 which can be used to visually determine the angle to which the pipe is being bent. These angle indications 34 include the numerals 0, 15, 30 and other numerals up through a 90° angle. The layout chart 30 further includes indicia or markings 35 that serve to indicate the length of the pipe in one direction, and arranged at right angles with respect to the markings 35 is a similar row or set of markings 36 which can also be used to ascertain the length of pipe being bent.

Previously, it has been the practice in bending pipe to use or employ a pipe-bending mechanism that may be hydraulically actuated, and the pipe to be bent was moved each time a new

configuration was to be applied to the pipe. However, by means of the method and apparatus of the present invention, the section of pipe, such as the pipe P, is maintained immobile or stationary while a pipe-bending mechanism is moved along the section of pipe so as to shape or bend the pipe P to the desired configuration, as later described in this application. To accomplish this, a pipe-bending mechanism **37**, Figure 1, is movably mounted on the platform **21**. The pipe-bending mechanism **37** includes a horizontally disposed plate or mount **41** which has a plurality of sockets **38** secured to its under surface, Figure 10, by suitable securing elements, such as screws or bolts **39**. The sockets **38** each rotatably carry a ball or ball bearing **40**, and the plurality of ball bearings **40** engage the upper surface of the platform **21** so as to provide that the pipe-bending mechanism **37** will be mobile on the platform **21**. The sockets **38** are so constructed that the balls **40** will not accidentally fall therefrom.

The pipe-bending mechanism **37** has secured to its upper surface a conventional unit which includes a housing **42** that is adapted to be connected to a source of hydraulic fluid or power. A frame **43** also constitutes part of the conventional bending unit, the frame **43** carrying the pair of blocks **44** which serve to engage one side of the pipe P being bent. A plunger **45** engages the opposite side of the pipe P, the plunger **45** being actuated by the hydraulic pressure supplied to the housing **42**.

For supporting the free end of the pipe P, and for preventing the pipe P from scratching or otherwise damaging the layout chart **30**, an auxiliary leveling unit **46** is provided, Figure 7. The leveling unit **46** can be moved to any desired position along the platform **21**, and the leveling unit **46** includes a horizontally disposed beam **47** which is supported by a pair of vertically disposed, threaded shafts **48**. The shafts **48** are each arranged in threaded engagement with a bushing **49** that is secured to the beam **47**, there being a shoe **50** arranged in engagement with the lower end of each of the shafts **48**. A hand wheel **51** is mounted on the upper end of each of the shafts **48**, so that by properly rotating the hand wheel **51**, the shafts **48** can be rotated to raise and lower the corresponding end of the beam **47** so as to level or properly align the free end of the pipe P being supported.

A means is provided for properly clamping the pipe P so that it will remain immobile while being bent, and this means also includes a leveling mechanism to insure that the pipe P is at the proper horizontal level with respect to the pipe-bending mechanism **37**. This last-named means for leveling and clamping the pipe P is designated generally by the numeral **52**, and it will be seen from Figure 1 that there are two of these vise-like assemblies **52**. Since each of these vise-like assemblies **52** has the same construction, only one will be described in detail. The detailed construction of one of these vise-like assemblies **52** is shown in Figures 3, 4, 5 and 6.

The vise-like assembly **52** includes a vertically disposed post **53** which may be connected to the edge of the table **20** in any suitable manner, and a vertically disposed plate **54** has one end secured to the post **53**, as by welding. The upper edge of the plate **54** slidably projects into a groove **55** which is arranged in the lower surface or base **56** of a jaw **57**, Figure 5. The jaw **57** is adapted to be mounted so that it can be moved toward and away from the post **53**, whereby the pipe P can be clamped between the jaw **57** and post **53** while the pipe is being bent. For causing this movement, a shaft **58** has a hand wheel **59** mounted on one end thereof, and a portion **60** of the shaft **58** is threaded exteriorly, the threaded portion **60** being arranged in engagement with a threaded bore **61** that is formed in the base **56** of the jaw **57**. The other end of the shaft **58** is rotatably connected to a bushing **62**, Figure 4, so that by properly rotating the hand wheel **59**, the shaft **58** can be rotated to thereby move the jaw **57** toward and away from the post **53** to thereby clamp or release the pipe P between the jaw and post.

Each of the vise-like assemblies **52** further includes a means for vertically adjusting the pipe P so as to insure that it is properly leveled or aligned with respect to the pipe-bending mechanism **37**. This last-named means includes a pair of spaced, parallel partitions **63** and **64**, Figure 6, and these partitions **63** and **64** are slidably connected to the post **53** so that they can be raised or lowered. The partitions **63** and **64** each include an upper shoulder **65** which provides a support for the pipe P, Figure 4. The uppermost portions of the partitions **63** and **64** are connected together by a horizontally disposed block **66**, and the lower end of a vertically disposed, exteriorly threaded shaft **67** is rotatably connected to the block **66**. A hand wheel **68** is mounted on the upper end of the shaft **67** for rotating the latter, the shaft **67** being arranged in threaded engagement with a bushing **69** that is mounted on the upper end of the post **53**. Thus, by properly rotating the handwheel **68**, the shaft **67** can be rotated to thereby raise or lower the partitions **63** and **64** which support the pipe P. It is to be understood that during this vertical adjustment of the pipe P, the jaw **57** is not in its clamping position, so that there will be no interference with vertical adjustment of the pipe P. The partitions **63** and **64** slide in or move in tracks or guideways that are defined by suitable angle irons **69** which coact with the post **53**, Figure 6, the angle irons **69** being secured to the post **53** and to a horizontally disposed brace **71**.

In use, the table **20** is set up or assembled, as shown in the drawings, and the shoes or support members **23** are adjusted on the shaft **24** so as to properly level the platform **21** on the table. If desired, the drop leaf **28** is moved to its operative or horizontal position, as shown in Figure 1*a*, and then the piece of pipe P that is to be bent or shaped is arranged so that it extends through the bending mechanism **37**. The pipe P is also supported by the partitions **63** and **64** of the vise-like assemblies **52**, and an end of the pipe P projects over the layout chart **30** and is supported on the auxiliary leveling unit **46**. The wheels **51** of the leveling unit **46** are rotated so as to position the end of the pipe at the proper level. Also, the wheels **68** are manually rotated in order to raise or lower the partitions **63** and **64**, whereby the pipe P can be located at the correct elevation with respect to the plunger **45** of the pipe-bending mechanism **37**. Next, the hand wheels **59** are rotated to move the jaws **57** into clamping relation with respect to the pipe P, whereby the pipe will not accidentally move while being bent or acted upon by the pipe-bending mechanism. Then, the plunger **45** of the pipe-bending mechanism is actuated by the usual hydraulic means, whereby the pipe P is caused to be bent to a desired angle. The angle to which the pipe is being bent can be accurately and exactly ascertained by observing the layout chart **30** below the project-

ing end of the pipe. Also, the pipe P is accurately bent or shaped by simply moving the pipe-bending mechanism 37 along the platform 21, and it is to be noted that it is not necessary to move the pipe P during this bending operation. The ball bearings 40 facilitate or insure a smooth movement of the pipe-bending mechanism 37 along the platform 21. After the pipe P has been bent to the desired shape, the jaws 57 can be loosened by means of the wheels 59 and the pipe P removed from the apparatus.

From the foregoing, it is apparent that a method of and apparatus has been provided which will facilitate or expedite the bending of pipes or conduits, the apparatus of the present invention including a layout chart which will enable the user to form the pipe to a predetermined figure or measurement. In the present invention, the pipe is secured in a plane surface, after proper leveling adjustments have been made, and the bending mechanism is moved along the pipe to shape the latter. The drop leaf 28 can be quickly raised or lowered in the event that a left or reversed bend is to be made in the pipe. The bending mechanism 30 can be readily shifted along the pipe so as to enable the pipe to be bent to the desired shape. The plate 41 of the bending mechanism 37 enables a quick shifting of the bending mechanism to the desired location on the platform 21.

We claim:

1. In combination, a table including a horizontally disposed platform, a plurality of vertically disposed legs for supporting said platform, a ground-engaging support member adjustably connected to the lower end of each of said legs, a pair of vises arranged in spaced relation along one side of said table and connected thereto, each of said vises including a vertically disposed post, a jaw mounted for movement toward and away from said post for clamping a pipe therebetween, leveling partitions for supporting said pipe mounted for vertical adjustment with respect to said post, manually operable means for adjusting said jaws and partitions, a calibrated chart arranged along a portion of the upper surface of said platform, a drop leaf hingedly connected to said platform.

2. In combination, a table including a horizontally disposed platform, a plurality of vertically disposed legs for supporting said platform, a ground-engaging support member adjustably connected to the lower end of each of said legs, a pair of vises arranged in spaced relation along one side of said table and connected thereto, each of said vises including a vertically disposed post, a jaw mounted for movement toward and away from said post for clamping a pipe therebetween, leveling partitions for supporting said pipe mounted for vertical adjustment with respect to said post, manually operable means for adjusting said jaws and partitions, a calibrated chart arranged along a portion of the upper surface of said platform, a drop leaf hingedly connected to said platform, and a pipe-bending mechanism movably mounted on said platform.

3. In combination, a table including a horizontally disposed platform, a plurality of vertically disposed legs for supporting said platform,

a ground-engaging support member adjustably connected to the lower end of each of said legs, a pair of vises arranged in spaced relation along one side of said table and connected thereto, each of said vises including a vertically disposed post, a jaw mounted for movement toward and away from said post for clamping a pipe therebetween, leveling partitions for supporting said pipe mounted for vertical adjustment with respect to said post, manually operable means for adjusting said jaws and partitions, a calibrated chart arranged along a portion of the upper surface of said platform, a drop leaf hingedly connected to said platform, a pipe-bending mechanism movably mounted on said platform, and an auxiliary leveling unit movably mounted on said platform for supporting the free end of the pipe being bent.

4. In combination, a table including a horizontally disposed platform, a pair of vises arranged in spaced relation along one side of said table and connected thereto, each of said vises including a vertically disposed post, a jaw mounted for movement toward and away from said post for clamping a pipe therebetween, leveling partitions for supporting said pipe mounted for vertical adjustment with respect to said post, manually operable means for adjusting said jaws and partitions, a calibrated chart arranged along a portion of the upper surface of said platform, and a drop leaf hingedly connected to said platform.

5. In combination, a table including a horizontally disposed platform, a pair of vises arranged in spaced relation along one side of said table and connected thereto, each of said vises including a vertically disposed post, a jaw mounted for movement toward and away from said post for clamping a pipe therebetween, leveling partitions for supporting said pipe mounted for vertical adjustment with respect to said post, manually operable means for adjusting said jaws and partitions, and a calibrated chart arranged along a portion of the upper surface of said platform.

6. In a pipe-bending layout, a table including a horizontally disposed platform, a pair of vises arranged in spaced relation along one side of said table and connected thereto, each of said vises including a vertically disposed post, a jaw mounted for movement toward and away from said post for clamping a pipe therebetween, leveling partitions for supporting said pipe mounted for vertical adjustment with respect to said post, and manually operable means for adjusting said jaws and partitions.

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