R. L. DAVIS & G. C. MOYERS.

PIPE BENDING APPARATUS.

APPLICATION FILED JUNE 9, 1916.

1,239,165.

Patented Sept. 4, 1917.

3 SHEETS—SHEET 1.

Fig. 1

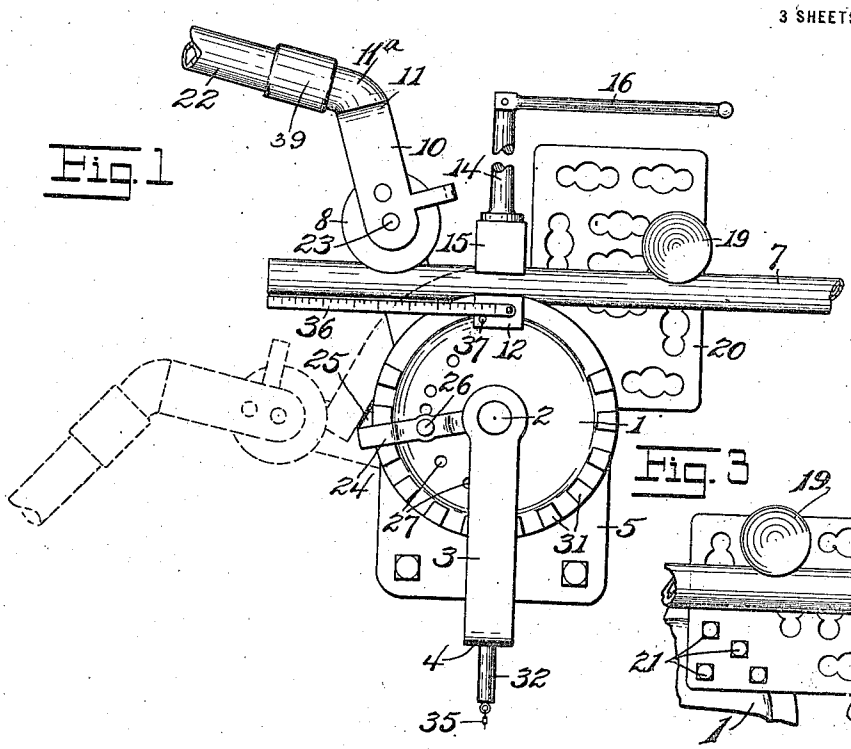
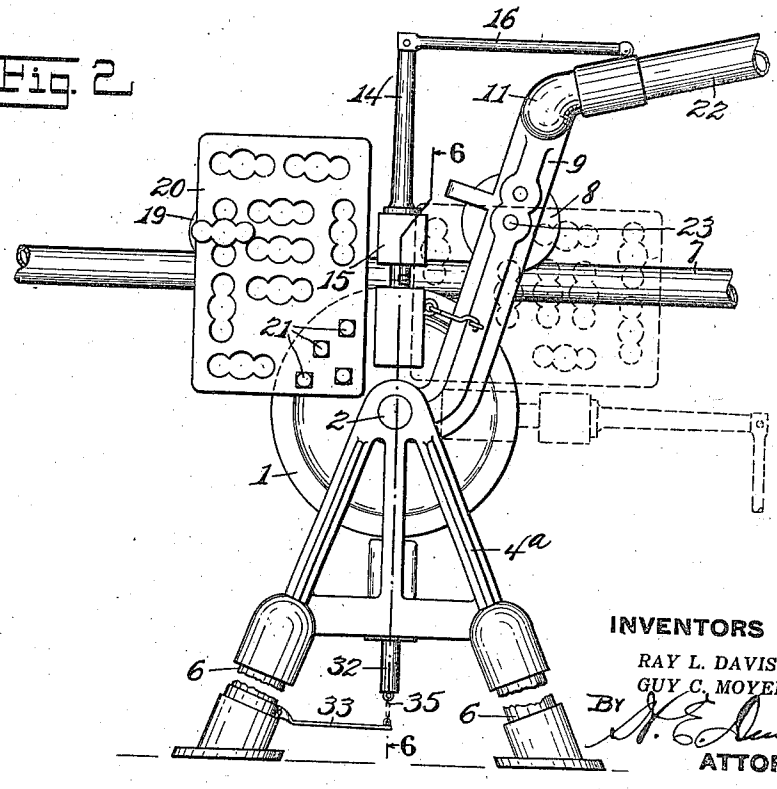


Fig. 3

Fig. 2



INVENTORS

RAY L. DAVIS

GUY C. MOYERS

By H. E. Davis

ATTORNEY

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Fig. 4

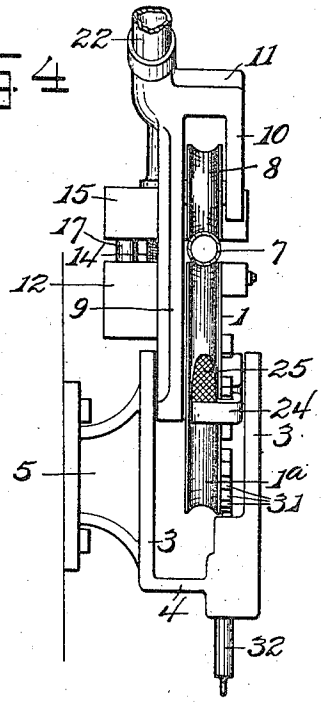


Fig. 5

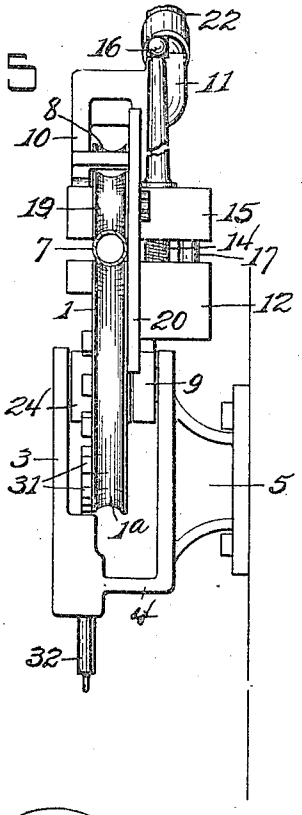


Fig. 6

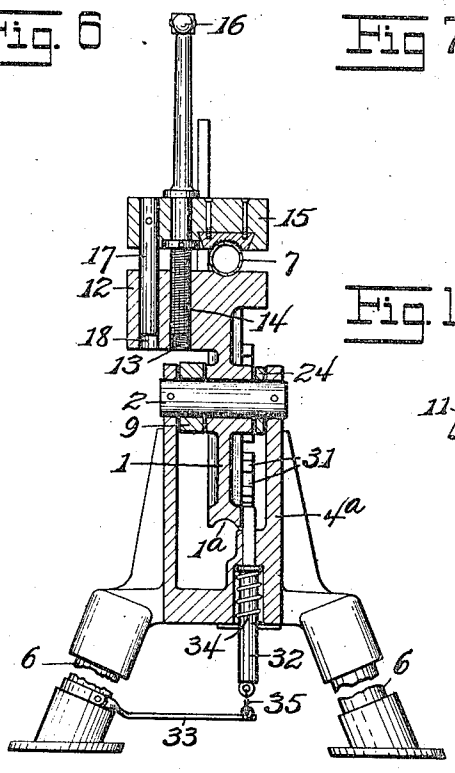


Fig 7

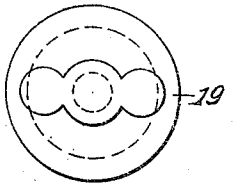
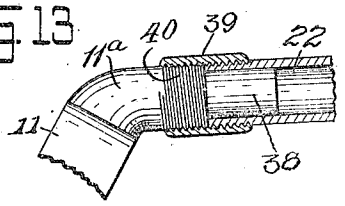


Fig. 13



INVENTORS

RAY L. DAVIS

GUY C. MOYERS

By M. E. Dunlap

ATTORNEY

R. L. DAVIS & G. C. MOYERS.

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3 SHEETS—SHEET 3.

Fig. 8

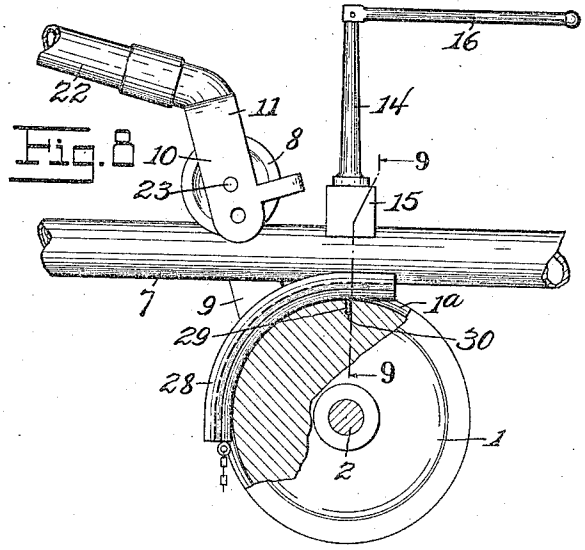


Fig. 9

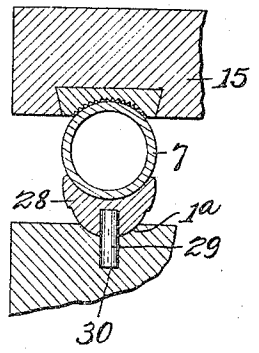


Fig. 10

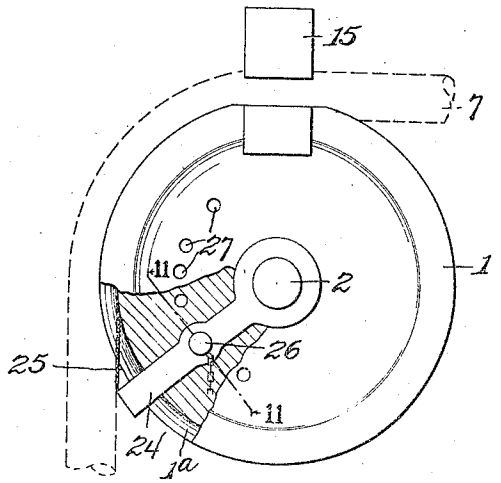


Fig. 12

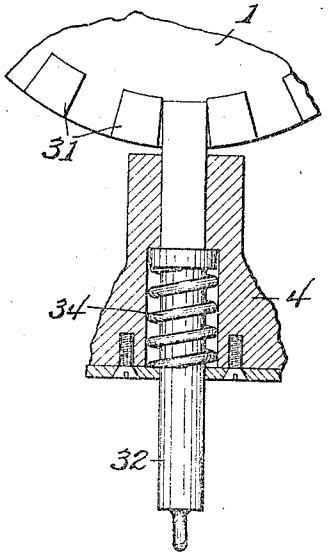
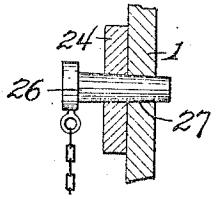


Fig. 11



INVENTORS

RAY L. DAVIS

GUY C. MOYERS

By M. E. Dunlap

ATTORNEY

UNITED STATES PATENT OFFICE.

RAY L. DAVIS AND GUY C. MOYERS, OF WHEELING, WEST VIRGINIA.

PIPE-BENDING APPARATUS.

BEST AVAILABLE COPY

1,239,165. Specification of Letters Patent. Patented Sept. 4, 1917.

Application filed June 9, 1916. Serial No. 102,695.

To all whom it may concern:

Be it known that we, RAY L. DAVIS and GUY C. MOYERS, citizens of the United States of America, and residents of Wheeling, county of Ohio, and State of West Virginia, have invented certain new and useful Improvements in Pipe-Bending Apparatus, of which the following is a specification.

This invention relates broadly to pipe bending devices, and it has for its primary object to provide an apparatus whereby accurate bends may be formed in pipes, lead cables, rods and the like.

A further object is to simplify and structurally improve the pipe bending apparatus disclosed in United States Patent No. 1,167,893, granted to us on the 11th day of January, 1916.

In describing the invention in detail, reference is herein had to the accompanying drawings, in which—

Figure 1 is a front side elevation of the invention showing the same designed for mounting upon a table or work-bench;

Fig. 2 is a rear side elevation of the invention, showing the same mounted upon legs;

Fig. 3 is a detail view in front elevation of the plug-board, showing an arrangement of plugs for forming a short bend in a pipe;

Fig. 4 is an edge view of the invention as disclosed in Fig. 1;

Fig. 5 is a view similar to Fig. 4, looking in the opposite direction;

Fig. 6 is a section on line 6—6, Fig. 2;

Fig. 7 is an enlarged inner face view of a plug;

Fig. 8 is a partial sectional view illustrating means for producing 90 degree curves of greater radius than that of the bending wheel;

Fig. 9 is an enlarged section on line 9—9, Fig. 8;

Fig. 10 is an enlarged sectional elevation illustrating the application of the adjustable stop;

Fig. 11 is an enlarged section on line 11—11, Fig. 10;

Fig. 12 is an enlarged detail section of the wheel-locking mechanism; and—

Fig. 13 is a detail section of the lever-handle coupling.

Referring to said drawings, in which like designating characters distinguish like parts throughout the several views—

1 indicates a wheel, hereinafter termed a bending wheel, which is rotatably mounted upon a shaft or spindle 2 having its ends fixed in the upright members 3 of a yoke-like support 4 which either may be carried by a bracket 5 adapted for attachment to a wall or work-bench, as shown in Figs. 1, 4 and 5, or may have the form shown at 4^a in Figs. 2 and 6 wherein it is designed for mounting upon supporting legs 6.

The bending wheel 1 has a peripheral groove or channel 1^a designed for receiving therein the pipe, as 7, to be bent; and arranged to coöperate with said wheel is a relatively small wheel 8 rotatable between the parallel arms 9 and 10 of a yoke 11, said arm 9 having a greater length than the arm 10 and being rotatably mounted on the axle 2 upon which the bending wheel is mounted.

The bending wheel 1 has a lateral extension 12 formed thereon at a suitable point, and provided in said extension is a vertical threaded bore 13 in which is mounted the lower threaded end of an adjusting screw 14 having a portion thereof swiveled in a block 15 which overlies said wheel 1 and constitutes the movable jaw of a vise of which said wheel, with its extension 12, constitutes the companion jaw. Said adjusting screw 14 has a horizontal arm or lever 16 attached to its upper end whereby it may be rotated for adjusting the jaw 15 with respect to the periphery of the bending wheel. Suitable means, as a guide-pin 17 carried by the movable jaw 15 and vertically movable in a vertical bore 18 in the extension, or lower jaw, is provided for guiding said movable jaw in its movements.

In practice, said movable jaw is adjusted with respect to the wheel 1 for rigidly clamping in place on the latter the pipe to be bent, said pipe being disposed in a horizontal position, as shown in Figs. 1 and 2, and having a portion thereof closely underlying a plug 19 which is removably mounted in an appropriate position in an upright plug-board 20 which is rigidly mounted, as by means of bolts 21, upon the rear face of the bending wheel and which lies in a plane parallel to said wheel. Said board, in the

normal working position of the device, occupies an upright position parallel to the adjusting screw 14, as shown in Figs. 1 and 2.

An operating lever 22 is attached to the yoke 11 and is adapted to be thrust downward by hand to cause the wheel 8 overlying the pipe held by the jaws of the vise to ride downward upon said pipe and to bend the latter over the periphery of the wheel 1, as shown in dotted lines in Fig. 1. Due to the fact that the arm 9 and wheel 1 are mounted upon the same shaft or axle, the wheel 8 will obviously be maintained throughout its movement at an even distance from the periphery of said wheel 1. Two or more sets of holes for the pin 23 upon which the wheel 8 is mounted are provided in the yoke arms 9 and 10, thus providing for adjustment of said wheel to suit the size of the pipe to be bent.

An adjustable gage arm 24 is provided whereby the bending action is stopped at a predetermined point, said arm being loosely mounted upon the axle 2 and having its outer end turned laterally across the periphery of the wheel 1 and carrying an upwardly inclined lug or stop 25 having its outer face disposed tangential with respect to and lying in the groove of the wheel 1. Said arm is adjusted to a predetermined position, whereupon a taper-pin 26 is directed through said arm into seating relation to one of a plurality of pin holes or sockets 27 provided therefor in the bending wheel, whereby said arm is rigidly maintained in fixed relation to said wheel, as shown in Fig. 10.

To adapt the device for the production of regular bends having a radius approximating, but greater than, that of the bending wheel, arc-shaped detachable shoes 28 of varying thicknesses may be provided, said shoes being of substantially crescent shape in cross section, as shown in Fig. 9, having their under sides shaped to seat in the circumferential groove or channel 1^a of wheel 1 and having their outer faces respectively provided with a channel adapted to snugly receive therein a pipe of a certain size. The shoe has a radially projecting pin 29 fixed on its under side adjacent to its upper end adapted to seat in a socket 30 provided therefor in the wheel 1, whereby said shoe is held in seated position.

The bending wheel 1 has a plurality of laterally disposed spaced teeth 31 formed on the front face thereof adjacent to its periphery, and normally disposed between two of the lowermost of said teeth is the upper end of a rod 32 whereby said wheel is locked against rotation. Said locking rod is mounted in and movable through a suitable part of the head of the yoke-like support 4 and is normally held in the upwardly-thrust wheel-locking position aforesaid by means of a suitably arranged spring, as the spring 34 shown in Fig. 12. A suitable foot-operated lever or treadle 33 is connected in an appropriate manner, as by a chain 35, to the lower end of said rod whereby the latter may be drawn downward to release said wheel.

When a bend has been formed in a pipe which utilizes the limit of the throw of the lever 22, and it is desired to produce a bend of still greater length, the bending wheel may be rotated forward a suitable distance and the said lever again depressed the requisite distance.

As is obvious, the whole mechanism sustained by the axle 2 may be swung to the position indicated in dotted lines in Fig. 2 and in full lines in Fig. 3, as when it is desired to position the plug-board for hand-bending of pipes.

A gage is provided whereby the length of bend to be formed at the end of a pipe may be accurately gaged. Said gage consists of a graduated rod 36 having an end pivotally connected to the face of the extension 12 and which is adapted to be supported by a stationary pin 37 or equivalent device in a horizontal position, as shown in Fig. 1. When not in use said gage may be swung over to occupy a suspended vertical out-of-the-way position. The graduations employed on the rod 36 may be of any appropriate character, as in inches and fractions of inches measured outward from the center line of the vise, as shown in Fig. 1. When the bend is to terminate at a given distance, as for example, eighteen inches from the end of the pipe, the latter is positioned so that its end registers with the 18-inch mark or graduation on the rod, after which said rod is swung to its out-of-the-way position aforesaid.

In order to prevent the breakage which frequently results from the great strains imposed upon the operating lever 22, a novel form of coupling is provided whereby said lever is connected to the yoke 11, as shown in Fig. 13. The arm 11^a of said yoke has a stub end 38 of such a reduced thickness or diameter that the same is snugly receivable within the threaded end of the tubular lever 22 which is commonly employed. Said threaded end of the lever is threaded within the end of a union 39 which has its opposite end mounted on the threaded portion 40 of said arm adjacent to said stub end. As a result of the additional bearing afforded by said stub end, the tendency of the lever to break at the threads thereof is practically eliminated.

What is claimed is—

A pipe bending apparatus comprising a support, a circumferentially grooved bending wheel rotatable on said support, means for clamping a pipe in the groove of said

wheel, means mounted on the axis of said wheel and adapted for movement adjacent to the periphery of the latter whereby the pipe is bent about said periphery, a gage-arm rotatable on said axis, a lug-like member carried by said arm disposed in the groove of said wheel and having its outer face disposed tangentially with respect to said groove, said face being adapted to have the pipe abut thereagainst for limiting the bending movement and means for securing said arm in adjusted position.

In testimony whereof we affix our signatures in presence of two witnesses.

RAY L. DAVIS.
GUY C. MOYERS.

Witnesses:
H. E. DUNLAP,
W. F. KEEFER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."