G. R. MOORE AND C. S. LEONARD.

PIPE BENDER.

APPLICATION FILED OCT 2, 1919.

1,349,219. Patented Aug. 10, 1920.

2 SHEETS—SHEET 1.

Fig. 1.

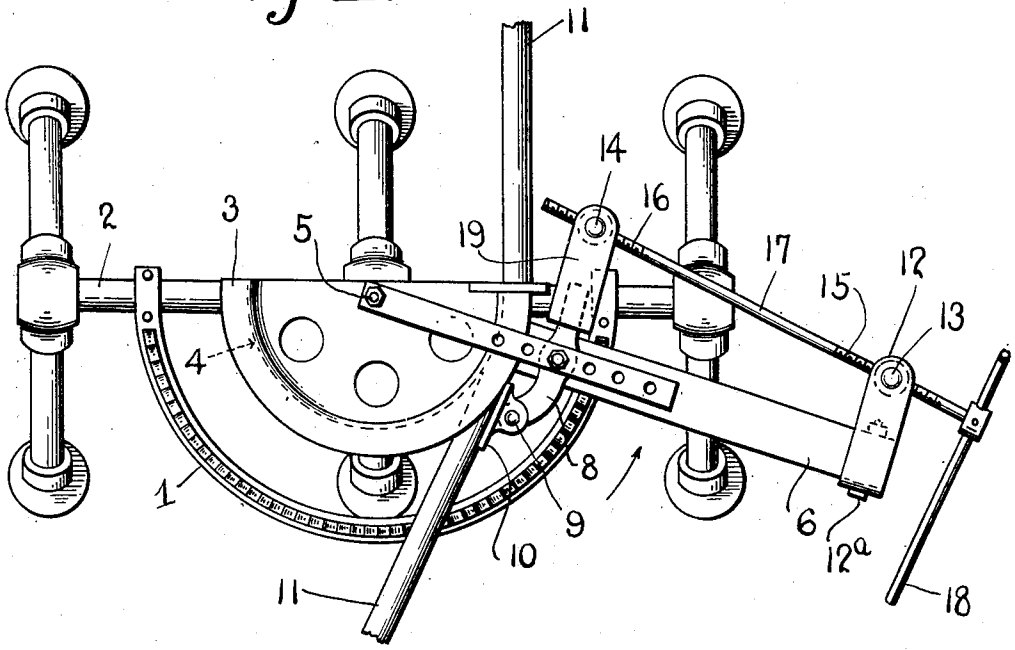
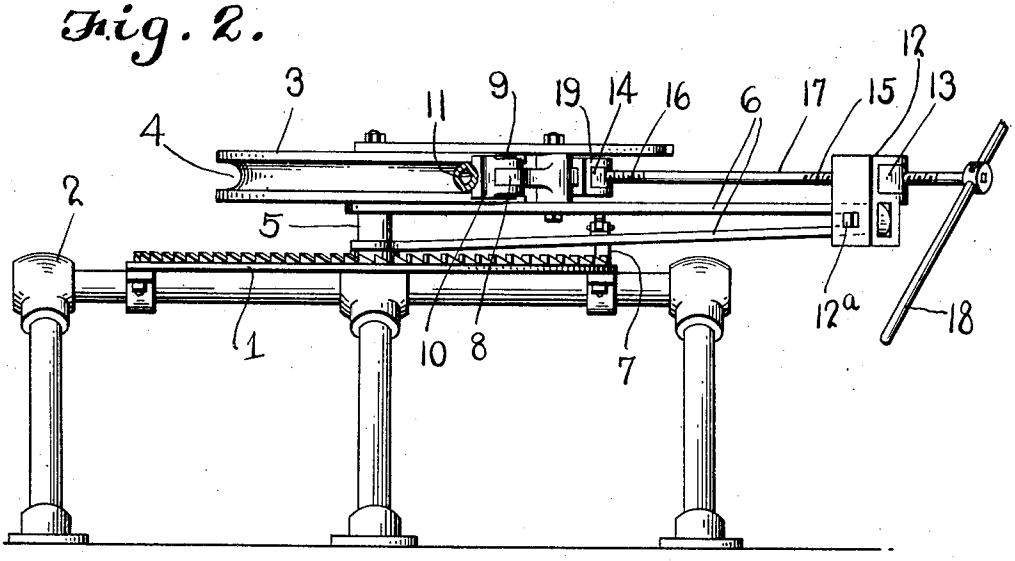


Fig. 2.



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2 SHEETS—SHEET 2.

Fig. 3.

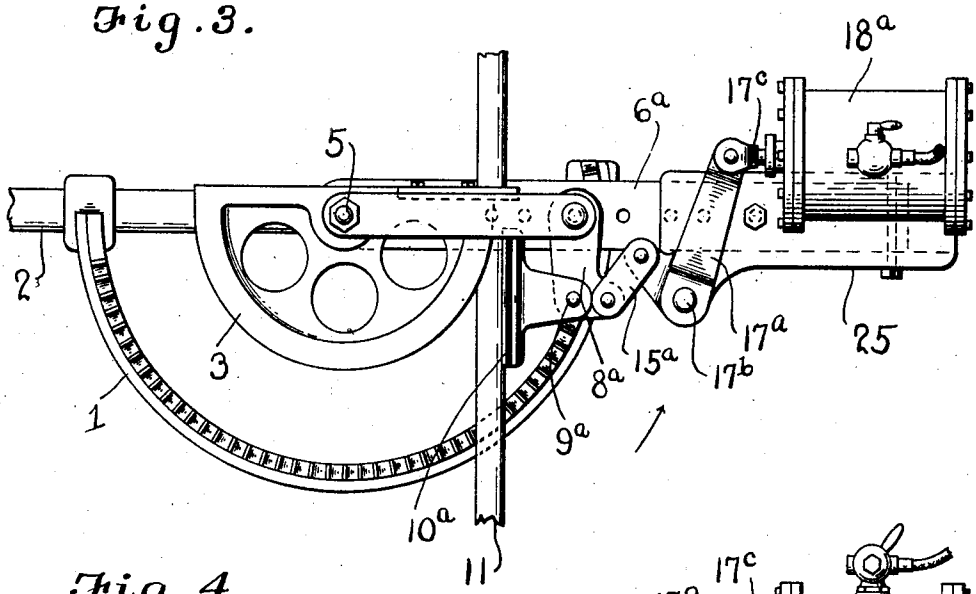


Fig. 4.

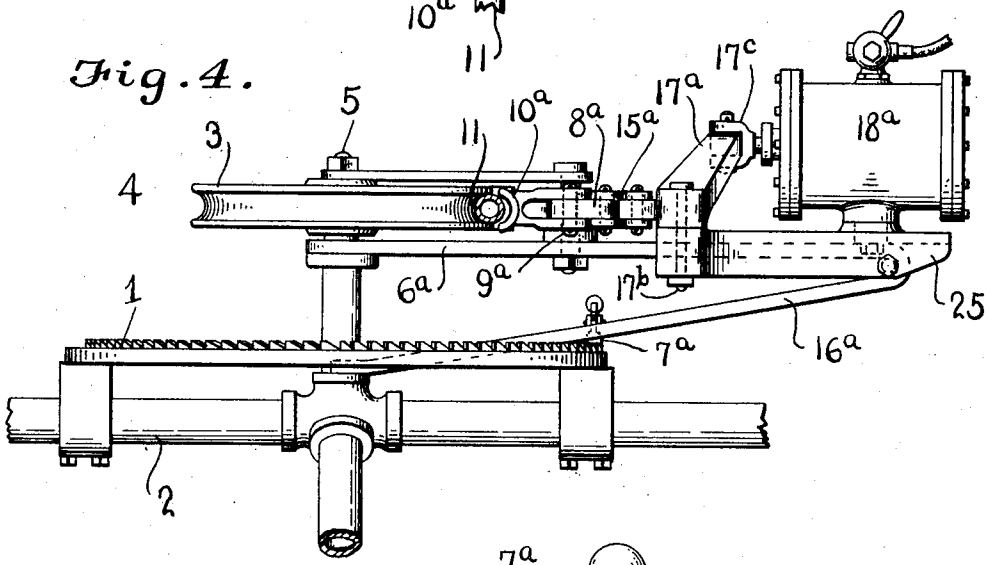
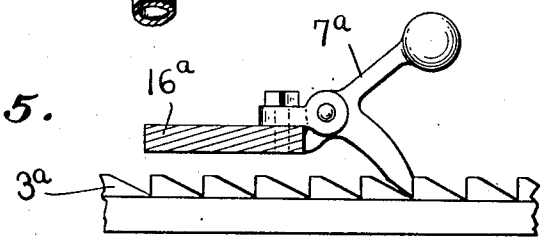


Fig. 5.



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PIPE-BENDER.

1,349,219. Specification of Letters Patent. Patented Aug. 10, 1920.

Application filed October 2, 1919. Serial No. 327,867.

To all whom it may concern:

Be it known that we, GEORGE R. MOORE and CHESTER S. LEONARD, citizens of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented new and useful Improvements in Pipe-Benders, of which the following is a specification.

The object of our present joint invention is the provision of a pipe bender in which the power for performing the bending function is applied at the point where it is needed, and in that way the imposition of undue strain on the bender as a whole is obviated, and any tendency to wrench the bender as a whole from its fastenings is averted.

To the attainment of the foregoing, the invention consists in the improvement as hereinafter described and definitely claimed.

In the accompanying drawings, hereby made a part hereof:

Figure 1 is a plan view of the hand-operated embodiment of our invention.

Fig. 2 is a side elevation of the same.

Fig. 3 is a plan of a power-operated embodiment.

Fig. 4 is a side elevation of said embodiment.

Fig. 5 is an enlarged detail view showing the relation of the detent to the segmental ratchet bar.

Similar numerals designate corresponding parts in Figs. 1 and 2, to which reference will first be had.

In the present and best practical embodiment of our invention of which we are cognizant, a segmental ratchet bar 1 is fixed to a main frame 2, and said main frame 2 is designed to be secured in position in any approved manner. Also fixed to the main frame 2 is a bending form 3, preferably, though not necessarily, semi-circular in form and circumferentially grooved at 4. By preference the form 3 is detachably fixed with respect to the frame, so that forms 3 of different sizes may be used as occasion demands.

Movable horizontally on a center 5 is a lever 6, and carried by the said lever is a detent 7, designed to prevent casual movement of the said lever in the direction indicated by arrow in Fig. 1.

Fulcrumed at an intermediate point of its length to the lever 6, is a pipe-bending lever 8, on the inner arm of which is pivotally mounted at 9 a pipe-bending shoe 10. A pipe 11 is shown in Figs. 1 and 2 in position to be bent.

At its outer end the lever 6 is equipped with a lateral arm 12, and in the said arm 12 and also in that arm of the lever 8 remote from the shoe 10 are journaled nuts 13 and 14, the bores of which are oppositely threaded.

Extending through and engaging the threaded bores of the nuts 13 and 14, are oppositely disposed threaded portions 15 and 16, respectively, on a power-applying shaft 17 having at its outer end a handle 18. It is to be understood here that it is within the purview of our invention to employ any power-applying means for accomplishing the bending of the pipe in coöperation with the lever 8, shoe 10 and form 3.

In the practical operation of the bender of Figs. 1 and 2, the pipe is positioned as illustrated, and the lever 6 is swung in the direction opposite to that indicated by the arrow, after which the shaft 17 is actuated to draw the outer arm of the lever 8 outwardly and thrust the inner arm of said lever 8 and the shoe 10 inwardly, this latter bringing about the powerful bending of the pipe without any tendency to impose strain upon the bender as a whole, with the attendant liability of wrenching the frame 2 from its fastenings as is the case when a very long lever is employed for bending purposes and power is applied to the outer arm of the said lever. The operation described is repeated as many times as are necessary, and from this it will be understood that through the medium of our improvement the pipe is bent in a step by step manner. In the embodiment illustrated in Figs. 1 and 2, the power-applying means is in the form of an attachment, and includes the shaft 17, a section 19 slipped on the outer arm of the lever 8 in the same manner as the long lever handle heretofore employed, and a section that forms the before-mentioned lateral arm 12 on the lever 6; the latter section being bolted at 12^a to the lever 6. In the said section the nuts 13 and 14, before mentioned, are mounted. It will be readily appreciated that incidental to the bending operation, the detent 7, by cooperation with the segmental ratchet bar 1 will preclude casual movement of the lever 6 in the direction of the arrow in Fig. 1. Said detent 7 and ratchet bar 1 will not, however, interfere with movement of the lever 6 in the direction opposite to that indi-

cated by the arrow, as when it is necessary to position the shoe 10 for a fresh bending operation.

In the power embodiment shown in Figs. 3, 4 and 5, a fluid pressure cylinder 18^a is carried on the lever 6^a, and a bell crank 17^a is fulcrumed at 17^b on said lever 6^a. One arm of the bell crank 17^a is connected with the piston 17^c in the cylinder 18^a, and the other arm of said bell crank is connected through a link 15^a with a pipe-bending lever 8^a fulcrumed on the lever 6^a; the said pipe-bending lever 8^a having pivoted at 9^a thereto a bending shoe 10^a. On a lower portion 16^a of the lever 6^a is carried a detent 7^a, weighted, by preference, in the manner shown in Fig. 5, and designed to coöperate with the segmental ratchet bar 3^a in preventing casual movement of the lever 6^a in the direction indicated by arrow in Fig. 3.

The practical operation of the power embodiment is substantially the same as that of the hand-operated embodiment—*i. e.*, the lever 6^a is swung manually on its center to position the shoe 10^a relatively to the pipe to be bent, and then fluid under pressure, preferably compressed air, is let into the cylinder 18^a so as to move the shoe 10^a toward the form 3.

By comparison of Figs. 3 and 4 it will be apparent that the improvement is preferably in the form of an attachment readily applicable to the lever 6^a; the said attachment including a sleeve-like body 25 that carries the cylinder 18^a and the other parts, and is bolted on the lever 6^a.

In the power embodiment, as well as in the hand-operated embodiment, the pipe is bent in a step by step manner through the operation of the shoe 10^a and by the application of stress to said shoe and without tendency to wrench the organized mechanism as a whole.

The lever 6 in Figs. 1 and 2, and the lever 6^a in Figs. 3 to 5, serves to position the bending shoe, and therefore each of said levers may be properly denominated a positioning lever.

Having described our invention, what we claim and desire to secure by Letters-Patent is:

1. An organized pipe-bending mechanism comprising in combination a form, a positioning lever, means for holding the positioning lever against swinging movement in one direction, pipe-bending means carried by and movable on the positioning lever, and means on the positioning lever to actuate the pipe-bending means individually.

2. An organized pipe-bending mechanism comprising in combination a form, a positioning lever, means for holding the positioning lever against swinging movement in one direction, a pipe-bending lever carried by the positioning lever, and means on the positioning lever to actuate the pipe-bending lever individually.

3. An organized pipe-bending mechanism comprising in combination a form, a positioning lever, means for holding the positioning lever against swinging movement in one direction, a pipe-bending lever carried by the positioning lever, a bending shoe on said bending lever, and means on the positioning lever to actuate the pipe-bending lever individually.

4. An organized pipe-bending mechanism comprising in combination a form, a fixed segmental ratchet bar, a positioning lever, a detent on the positioning lever for coöperation with the segmental ratchet bar to hold said lever in various positions against movement in one direction, pipe-bending means carried by the positioning lever, and means on the positioning lever to individually actuate said pipe-bending means.

5. An organized pipe-bending mechanism comprising in combination a form, a stationary segmental ratchet bar, a positioning lever, a detent on the positioning lever for coöperation with the segmental ratchet bar to hold said lever in various positions against movement in one direction, a pipe-bending lever attached to the positioning lever, a pipe-bending shoe on said bending lever, and means to individually actuate the pipe-bending lever; said actuating means being attached to the positioning lever.

6. An organized pipe-bending mechanism comprising in combination a form, a positioning lever, means for holding the said lever against movement in one direction, a bending lever on the positioning lever, an arm attached to the positioning lever, a section applied to the bending lever, oppositely threaded nuts journaled in said arm and section, a shoe on the bending lever, and an actuating shaft having oppositely threaded portions extending through and engaging said nuts.

7. An attachment for a pipe-bending machine comprising an arm adapted to be attached to a positioning lever, a section having a socket adapted to receive a bending lever, oppositely threaded nuts journaled in said arm and section, and an actuating shaft having oppositely disposed threads arranged in said nuts.

8. The combination of a positioning lever, a bending lever fulcrumed on said positioning lever, and a threaded actuating shaft connecting said bending lever and the positioning lever and having a threaded engagement with one of said mentioned elements.

In testimony whereof we affix our signatures.

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