M. L. ORUM.

PIPE BENDING MANDREL.

No. 179,130. Patented June 27, 1876.

Fig. 1

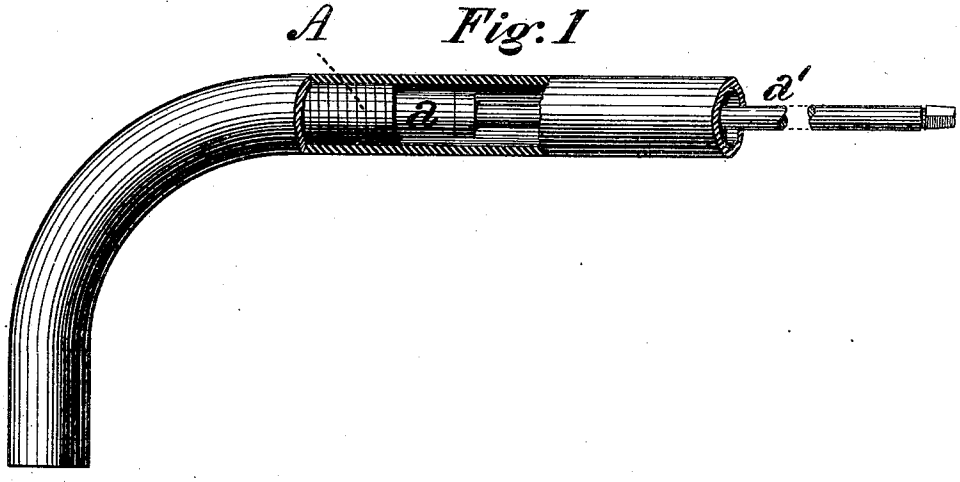


Fig. 2

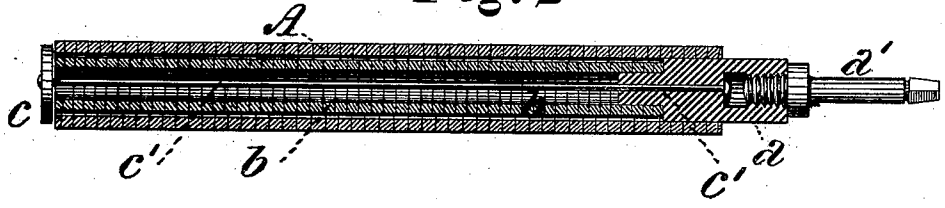
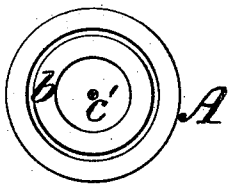


Fig. 3



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UNITED STATES PATENT OFFICE.

MORRIS L. ORUM, OF PHILADELPHIA, PENNSYLVANIA.

IMPROVEMENT IN PIPE-BENDING MANDRELS.

Specification forming part of Letters Patent No. **179,130**, dated June 27, 1876; application filed June 1, 1876.

To all whom it may concern:

Be it known that I, MORRIS L. ORUM, of the city and county of Philadelphia, in the State of Pennsylvania, have invented certain new and useful Improvements in Attachments for Pipe-Bending Mandrels, of which the following is a specification:

My invention relates to flexible mandrels, used as internal supports for metal pipes in the operation of bending; and its object is to provide simple and efficient means for making a bend at a distance from the end of the pipe without necessitating the use of a mandrel of a greater length than that of the bend, and for readily and conveniently withdrawing the mandrel after the operation of bending without injury to itself or to the pipe; to which ends my improvements consist in the combination, with a flexible mandrel, of a head-piece or plug, a key, a flexible core, and a check-piece, all as hereinafter fully set forth.

In the accompanying drawings, Figure 1 is a side view, partly in section, of a bent pipe, showing an internal flexible mandrel provided with a head-piece and key; Fig. 2, a longitudinal section of a flexible mandrel having a check-piece and a flexible core; and Fig. 3, an end view, on an enlarged scale, of the same, with the check-piece removed.

In the operation of bending metal pipes by the use of flexible mandrels the function of the mandrel is to support the pipe internally at the point or points of curvature while the pipe is being bent by the application of external pressure. At the close of the operation the mandrel is often found to be fixed so tightly in the pipe as to render its removal a matter of difficulty. This difficulty can be best overcome in mandrels composed of a spiral coil of wire by turning the spiral in a direction opposite to that of its lead, so as to reduce its diameter, thereby enabling it to be easily withdrawn.

The better to effect such withdrawal, I provide the flexible mandrel A, which is, in this case, a spiral coil of wire, with a plug or head-piece, *a*, which is secured in any suitable manner to one of its ends, and projects therefrom. The outer end of the head-piece *a* may be either squared, to receive a wrench or brace, or nicked for the application of a screw-driver in cases where it is used at or near the end of a pipe, so as to be readily turned while the pipe is held stationary.

To enable the mandrel to be applied at any point within the pipe without necessitating it to be made of greater length than that of the bend required, I provide a key, *a'*, consisting of a stout wire or rod, forming a shank, which may be of any desired length, and may be either screwed into the head-piece, as shown in Fig. 2, or fitted into or over a squared recess or projection thereon. The opposite end of the key *a'* is squared to receive a wrench. By this means the power requisite for removing the mandrel may be applied at any distance from the bend, and the length of the mandrel need be no greater than that of the bend.

I have found in practice that in the withdrawal of the mandrel the operator may injure it by screwing it so tightly together as to strain it, and for the purpose of preventing such accidents I provide a flexible core, *b*, placed within the mandrel A, the exterior diameter of the core being so much less than the interior diameter of the mandrel as to permit the latter to be reduced sufficiently to be withdrawn, while limiting such reduction to the point to which it can be carried without injury to the mandrel. The core is supported on a projection on the inner end of the head-piece *a*, to which it may be connected in any suitable manner so as to remain fast thereon. For the purpose of preventing any undue longitudinal strain upon the mandrel in withdrawing it, I provide a check-piece, *c*, which consists of a transverse plate or bar placed at the end of the mandrel opposite to that to which the head-piece *a* is fastened, and connected to the latter by a wire rope or chain, *c'*, passing through the interior of the mandrel. The check-piece *c* is made sufficiently large to prevent it from being drawn into the inside of the mandrel, and of less diameter than the outside of the latter, to prevent jamming in the pipe.

Should an undue strain be brought upon the mandrel in drawing it out of the pipe, it will be seen that the rope or chain *c'* will draw the check-piece up to a bearing against the free end of the mandrel, and, by transmitting the force exerted thereto, will prevent any injurious extension of its length.

The application of my attachments to flexi-

ble mandrels enables the important operation of withdrawal to be performed with as much safety and certainty as those of insertion and bending, and renders such mandrels practicable in situations and under circumstances which, without the application of these devices, would constitute serious, if not insuperable, objections to their use.

I claim as my invention, and desire to secure by Letters Patent—

1. The combination, with a flexible mandrel for bending metal pipe, of a head-piece or plug secured thereto, to enable the mandrel to be turned for removal from the pipe after being bent, substantially as set forth.

2. The combination, with a flexible mandrel for bending metal pipe, of a key fitting one of the ends of the mandrel, and having a shank extending longitudinally therefrom, so as to enable power to be applied for removing the mandrel while within the pipe, substantially as set forth.

3. The combination of a flexible mandrel for bending metal pipe and an inner flexible core, the outside diameter of which is less than the inside diameter of the mandrel, substantially as set forth.

4. The combination of a flexible mandrel for bending metal pipe, a transverse check-piece, placed without and at one end thereof, and a wire rope or chain, connecting the check-piece with the opposite end of the mandrel, substantially as set forth.

MORRIS L. ORUM.

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