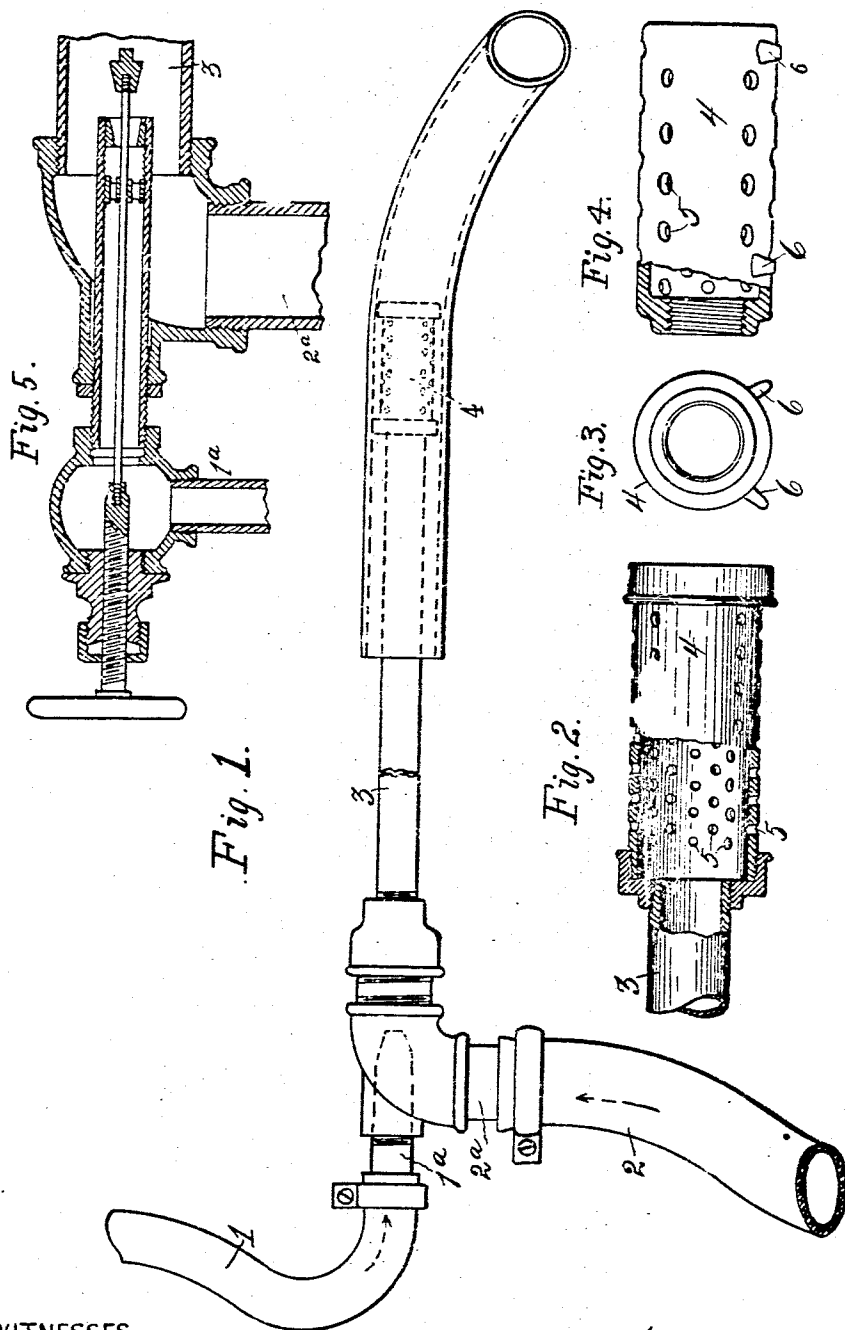


No. 886,036.

PATENTED APR. 28, 1908.

W. L. BROWN.
PROCESS FOR HEATING AND BENDING PIPES.
APPLICATION FILED NOV. 7, 1904.



WITNESSES:

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UNITED STATES PATENT OFFICE.

WILLARD L. BROWN, OF TOLEDO, OHIO, ASSIGNOR TO THE SHAW-KENDALL ENGINEERING COMPANY, OF TOLEDO, OHIO.

PROCESS FOR HEATING AND BENDING PIPES.

No. 886,036.

Specification of Letters Patent.

Patented April 28, 1908.

Application filed November 7, 1904. Serial No. 231,633.

To all whom it may concern:

Be it known that I, WILLARD L. BROWN, a citizen of the United States, residing at Toledo, in the county of Lucas and State of Ohio, have invented a certain new and useful Process for Heating and Bending Pipes; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

My invention is designed to furnish a process and apparatus for bending metal pipes, especially those of the larger sizes, which shall overcome the difficulties encountered in this industry in the use of the methods and implements heretofore employed.

Heretofore, in bending pipes, the part to be bent has been heated by means of an external fire, usually in a forge, the heating and bending taking place alternately as the pipe is slowly bent, step by step, to the required angle. My method of bending pipes consists in applying fire, at the proper point, to the interior of the pipe to be bent, and only to the outer or longer side of the bend so that the metal on the longer side of the bend will readily yield smoothly and evenly, and so that the metal in the inner or shorter side of the bend will not buckle or crimp.

In practicing my process I employ an apparatus illustrated in the accompanying drawings in which—

Figure 1 is a side-elevation of my device, showing the same, partly in dotted lines, in position for operation in connection with a pipe that is partly bent; Fig. 2, a side-elevation, partly in central vertical section, showing one form of burner used in connection with my device and process; Fig. 3, an end-view of a modified form of the same; Fig. 4, a side-elevation of said modified form, partly in central vertical sectional elevation, and Fig. 5, a central sectional elevation of a preferred form of the device for mixing the air and gas in proper proportions as they are supplied to the burner.

Like numerals indicate like parts throughout the drawings.

In the drawings, 1 is a flexible hose leading from a supply of liquid or gaseous fuel. 2 is an air-hose. These two lengths of hose

are provided with suitable valves or other devices, not shown in the drawings, for regulating the flow and pressure therein. These valves and regulating mechanisms will be understood without further illustration or description. The fuel hose and the air-hose discharge respectively into a short length of pipe, 1^a and 2^a, both leading into a single straight pipe 3 of suitable length and light enough to be easily handled manually. Upon the end of this pipe is a hollow cylinder 4, formed preferably of cast iron and of slightly less external diameter than the bore of the pipe to be bent. This cylinder, at one end, is axially mounted upon, and the hollow of the cylinder is in communication with pipe 3. The opposite end of the cylinder is closed. The wall of the cylinder is perforated as at 5. The perforations do not extend entirely around the cylinder, one of its sides being imperforate. The cylinder may be cast integral as shown in Fig. 4, or may be cast with one or both ends open and a cap or cover may be screwed onto the open end of the cylinder as illustrated in Fig. 2. In the large sizes the cylinder should, preferably, be provided with legs 6 which support the cylinder in proper relation to the pipe and afford stability to the cylinder when within the pipe to be heated and bent.

My process is performed and the operation of my device is as follows: The parts being assembled as above described, the gas being admitted through hose 1 and air through hose 2, in proper proportions and under proper pressure, the combustible mixture flows through the pipe 3 into the perforated cylinder 4. The gases issuing from the perforations are first lighted and the burner, which now burns like a torch, is then thrust into the pipe to the point where the bend is to begin, the pipe 3 serving as a handle for the manipulation of the burner. In inserting the perforated cylinder into the pipe, that side which is imperforate is placed next to the side of the pipe which is to form the inner side of the bend, while the perforated side of the cylinder, from which the flames are projected, is placed next to the side of the pipe which is to form the outer or longer side of the bend. In a short time the walls and the ends of the perforated cylinder become quite hot and the flame which up to this time has burned in jets outside the apertures in the cylinder, now, suddenly, with a

report, passes through the perforations to the interior of the cylinder. The cylinder being protected by the surrounding pipe from too rapid radiation now becomes extremely hot and forms a retort in which the gases become superheated and from each of the holes in the wall of the cylinder issues a pale blue flame, almost invisible and of extremely high temperature. As soon as this intensely hot flame begins to issue from the apertures in the cylinder the pipe rapidly becomes heated to a sufficient degree to permit its deflection to any desired angle upon any desired curve by any of the usual methods employed for placing lateral strains upon pipes or bars in the bending process. The pipe being sufficiently bent at one point, the hot retort is slightly withdrawn and now an adjoining portion of the inclosing pipe is heated and bent. Thus the heating and bending continues until the pipe has been given the proper and desired curve.

In practice it is found that tubes bent according to my method are smooth and that there is a total absence of creases and buckles which are found in pipes bent by the ordinary process in which the pipe is heated externally around its entire circumference. Since with my method it is unnecessary to return the pipe several times to the forge to be reheated during the bending operation, and since by my method the heat may be directly applied, without intermission, at

exactly the right spot in the pipe, the great saving in time labor and fuel will be obvious. 35

Having described my invention, what I claim as my invention and desire to secure by Letters Patent is—

1. The process of bending pipes which consists in applying heat from and to the interior of the pipe to be bent on the side which is to form the longer side of the bend, and then subjecting the pipe to lateral strains at opposite sides of the heated portion. 40

2. In the process of bending pipes, the steps which consist in supplying a fluidal fuel to a burner introduced into the pipe to be bent, and consuming the fuel within the pipe at the point where the bend is to take place and then subjecting the pipe to lateral strain at opposite sides of the heated portion. 45 50

3. The herein described improvement in the art of bending pipes, which consists in the application of heat directly to the inner surface of the wall of the pipe by means of a burner, and then bending the pipe while the same is subjected to the heating medium, substantially as specified. 55

In testimony whereof I affix my signature in presence of two witnesses. 60

WILLARD L. BROWN.

Witnesses:

CLEM V. WAGNER,
ALMON HALL.