

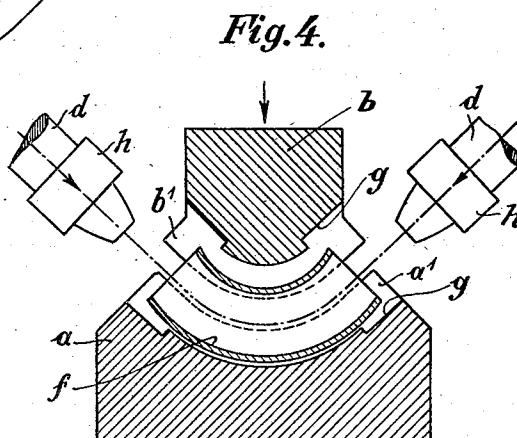
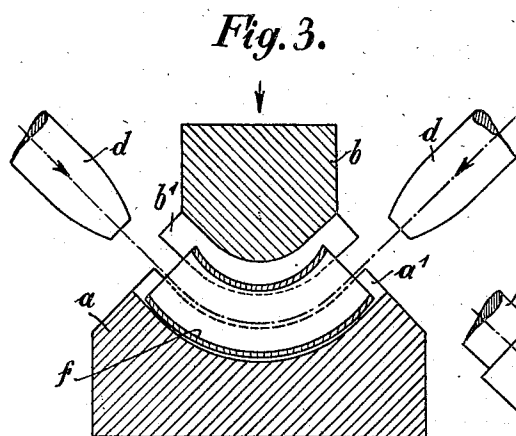
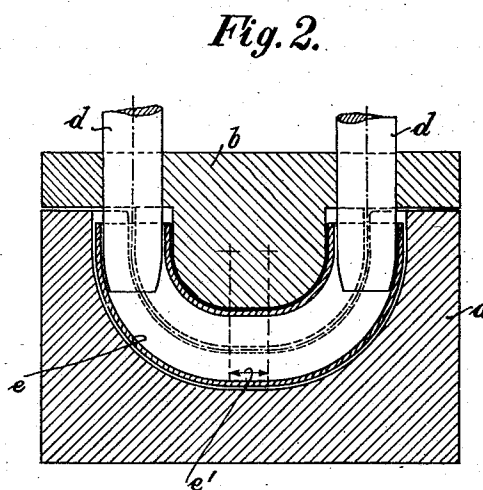
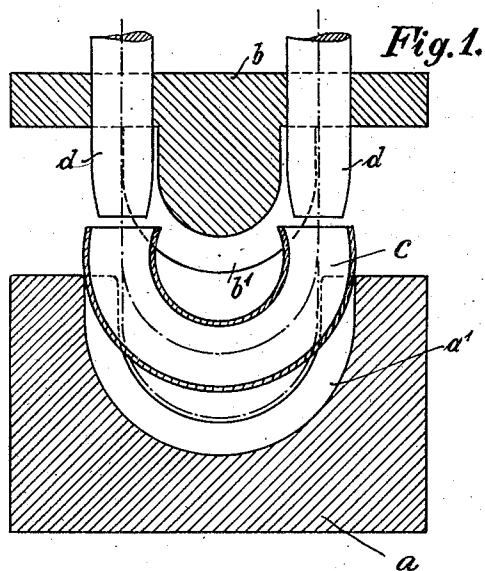
Nov. 11, 1930.

R. H. BÖHLING

1,781,567

APPARATUS FOR PRODUCING BENT PIPES OF CORRECT PRESCRIBED LENGTHS

Filed April 6, 1929



Inventor
R. H. Böhling,
BY Langmuir, Perry, Ward & Langmuir

ATTY. S.

UNITED STATES PATENT OFFICE

RUDOLF HIERONYMUS BÖHLING, OF HAMBURG, GERMANY, ASSIGNOR TO THE FIRM OF ROHRBOGENWERK GESELLSCHAFT MIT BESCHRANKTER HAFTUNG, OF HAMBURG, GERMANY

APPARATUS FOR PRODUCING BENT PIPES OF CORRECT PRESCRIBED LENGTHS

Application filed April 6, 1929, Serial No. 353,103, and in Germany June 14, 1928.

In producing bent pipes, such as elbows, return bends and the like from wrought iron, ductile or malleable iron the observance of the exact desired or prescribed length (distances between centers) is difficult. Particularly with return bends it is very difficult to secure the correct distance of the centers of the end openings or bores. In one of the known modes of manufacture of bent pipes the ends are not straight tangential, but assume a position within the curvature of the bend. For connecting bent pipes or bends by the aid of flanges or faucets it is necessary to straighten out their ends.

According to the present invention a device is designed, by which the correct length of the bends may be secured, and at the same time the ends of the bent pipes straightened. When both objects are secured by one and the same apparatus warrant is given that the straightened-out ends will have the correct prescribed length.

The apparatus may be so constructed, that by its means the straightened-out ends at the same time are also provided with faucets or with beads or turned-up edges for holding loose flange disks.

The apparatus comprises a sectional or two-part mold, one part (the stationary section) with regard to its cavity exactly corresponding to that half of the bend which comprises the outer curvature, while the other section or part of the mold (the movable section) corresponds to that half of the bend which comprises the inner curvature of the bend in its final shape. By forcing the two sections of the mold together, after the bent pipe has been introduced, the same will be given the exact desired shape, whereby the ends of the pipe are straightened out by mandrels forced into the ends either at the same time when the mold sections approach one another, or the mandrels are given a forward motion, or they are allowed to more or less follow the movements of the mold sections, thereby nicely straightening out the ends of the bent pipe. The two mandrels are so arranged and guided that their center lines have the correct distance from one another corresponding to the desired distance of the

center lines of the ends of the bend, thus giving the bend the prescribed length.

By the aid of the apparatus for producing the correct length of the bends moreover return bends may be so varied that when straightening out the ends also a short cylindrical portion may be obtained at the middle parts of the bend. Such return bends having a straight or cylindrical central portion equal to the double length of its straight ends, may be cut through at the center, thus producing two elbows having straight ends and the correct length, which, if desired, may be given a turned-up edge for holding a loose flange disk.

In the drawing by way of example three modes of construction are illustrated.

Fig. 1 is a section of a mold in an open position, that is to say, the two parts being at a distance from one another.

Fig. 2 is a section of a mold for producing a return bend adapted to give the latter a central cylindrical portion, the mold being shown in closed position.

Fig. 3 is a section of a mold adapted to produce an elbow in open position.

Fig. 4 is a section of a modified mold.

In the construction shown in Fig. 1 the mold section *a* has a concave cavity *a'* corresponding to the outer curvature of the outer half of the bend to be produced. This section of the mold thus constitutes a female die, the convex cavity *b'* of the other section *b* acting as a male die corresponding to that half of the return bend having the inner curvature. In closing the two sections *a* and *b* a cavity is formed having a circular cross section, corresponding exactly to the cross section of the bend to be produced.

When the return bend *c*, of which the ends are not yet straightened out, but constitute a prolongation of the arc of the bend, is introduced into the open die *a*, as will be understood by Fig. 1, and the die *b* is pressed down on the die *a* with a sufficient pressure, the return bend will be forced into the cavity *a'*, and thus changed as to shape. While performing this operation, however, the straightening out of the ends of the bend is not yet accomplished, because that portion, which is

situated on the outer side of the curvature, is not operated upon the dies *a* and *b*. For straightening the pipe ends the two mandrels *d* are used, which are somewhat rounded off or reduced at their ends, but otherwise correspond to the inner diameter of the pipe, which mandrels in the construction shown in Fig. 1 are parallel to one another, and their center lines are at a distance from one another corresponding to the desired length of the return bend to be produced. These mandrels are forced down into the return bend *c*. Hereby the dies *a* and *b* and the mandrels *d* co-operate to straighten out the ends of the return bend at the same time securing the proper length of the bend.

According to the material of which the bent pipe is made the operation of introducing the mandrels into the ends of the return bend may either be carried out simultaneously with the movement of the die *b*, or in advance or in arrear. In the first instance the construction may be such, that the mandrels are firmly attached to the die *b*.

By the construction shown in Fig. 2, in which the mold is shown closed, a return bend *e* may be produced, which in its middle part is given a straight or cylindrical portion *e'*. This straight portion is of such length that, when the return bend *e* is cut through at the center of the straight portion *e'*, the half of the straight portion *e'* left on each of the two elbows thus produced, is of sufficient length to permit a bead or a turned-up edge for a loose flange disk to be provided.

In Fig. 3 a mold is shown in section for producing an elbow. The dies *a* and *b* are constructed correspondingly to the shape of the elbow *f*. In this case the mandrels *d* are not parallel to one another, but are arranged in converging central lines. In the case of ordinary elbows the center lines of the mandrels form an angle of 90°.

The mandrel *d* may be arranged independent from the die *b* or may be combined with this mandrel.

When it is desired to provide the ends of the return bends *c* and *e* and the elbow *f* with a faucet or a turned-up edge, such may be produced simultaneously with shaping the end of the bend.

This object in view, as may be gathered from Fig. 4, the sections *a* and *b* of the mold are given correspondingly shaped recesses or enlargements *g* at the ends of the cavities, while the mandrels may be given correspondingly thickened parts, shoulders *h* or the like.

I claim:

1. An apparatus for giving bent pipes, elbows, bends, return bends or the like prescribed lengths, comprising a two-part mold and two mandrels, all four parts embracing a hollow space corresponding to the shape of the bend to be produced, the cavity of one die corresponding to the mating half con-

taining the outer curvature and the cavity of the other die corresponding to the mating half containing the inner curvature, means to move the dies upon one another in a direction parallel to the central plane of the bend and means to move the mandrels centrally to the open ends of the mold.

2. An apparatus for producing bent pipes according to claim 1 in which means are provided upon the ends of the dies and the mandrels to produce straight ends on the pipe when closing upon one another.

3. An apparatus for giving bent pipes, elbows, bends, return bends, or the like, prescribed lengths comprising a two-part mold, the two parts of which or dies when closing upon one another embrace a hollow space corresponding to the shape of the bend to be produced, the cavity of one die corresponding to the mating half containing the outer curvature, and the cavity of the other die corresponding to the mating half containing the inner curvature of the final bend, the two dies or mold sections thus being adapted to close upon one another when moved in a direction parallel to the central plane of the bend, and said two mold sections or dies have a central straight portion of such length that the return bend produced thereby is given a central cylindrical portion of similar length, so as when cut in the center to produce two elbows each having a cylindrical portion at each end.

4. An apparatus for giving bent pipes, elbows, bends, return bends, or the like prescribed lengths comprising a two-part mold, the two parts of which or dies when closing upon one another embrace a hollow space corresponding to the shape of the bend to be produced, the cavity of one die corresponding to the mating half containing the outer curvature, and the cavity of the other die corresponding to the mating half containing the inner curvature of the final bend, the two dies or mold sections thus being adapted to close upon one another when moved in a direction parallel to the central plane of the bend, and means located at the ends of the dies cooperating with the ends of the pipe to produce straight ends on the pipe.

In testimony whereof I have signed my name to this specification.

RUDOLF HIERONYMUS BÖHLING.