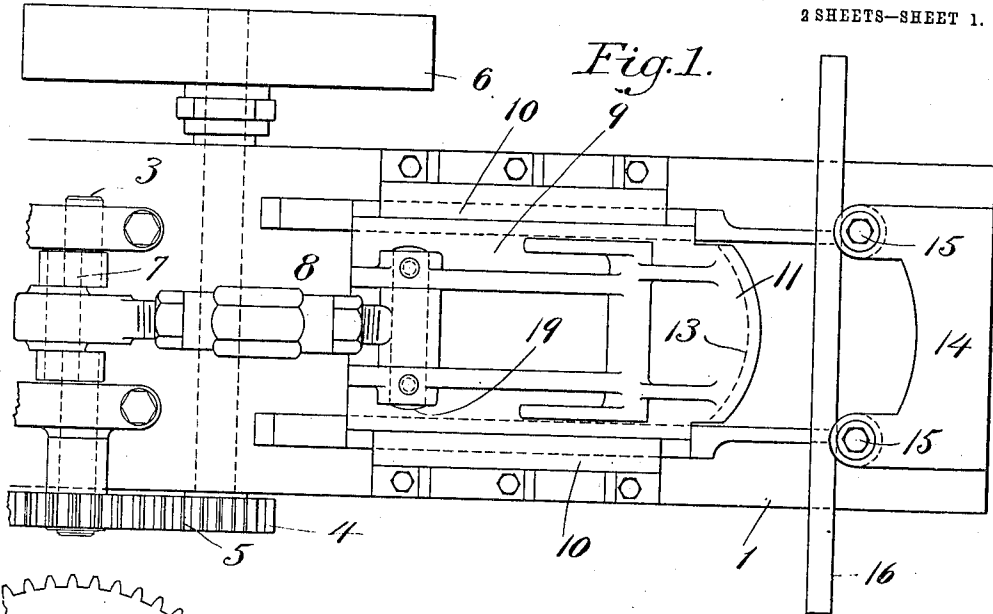
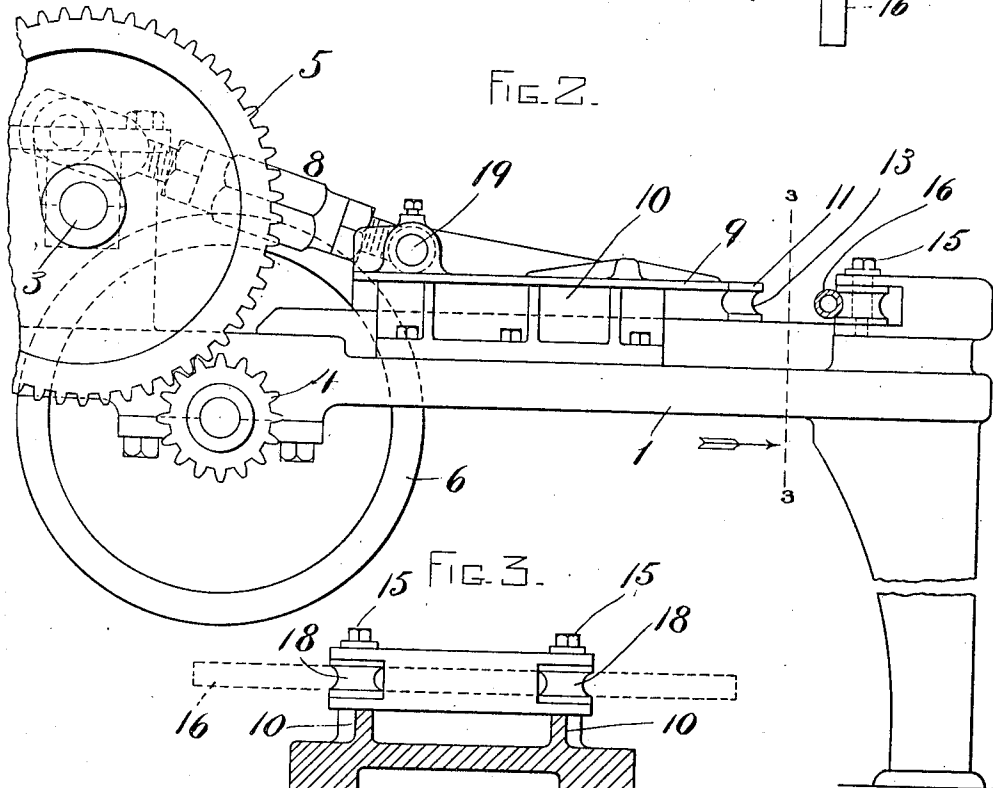


C. N. BROWN.
PIPE BENDING MACHINE.
APPLICATION FILED JULY 9, 1902.

926,093.

Patented June 29, 1909.

2 SHEETS—SHEET 1.



WITNESSES:
Adeline C. Raligan
P. H. Pezzetti

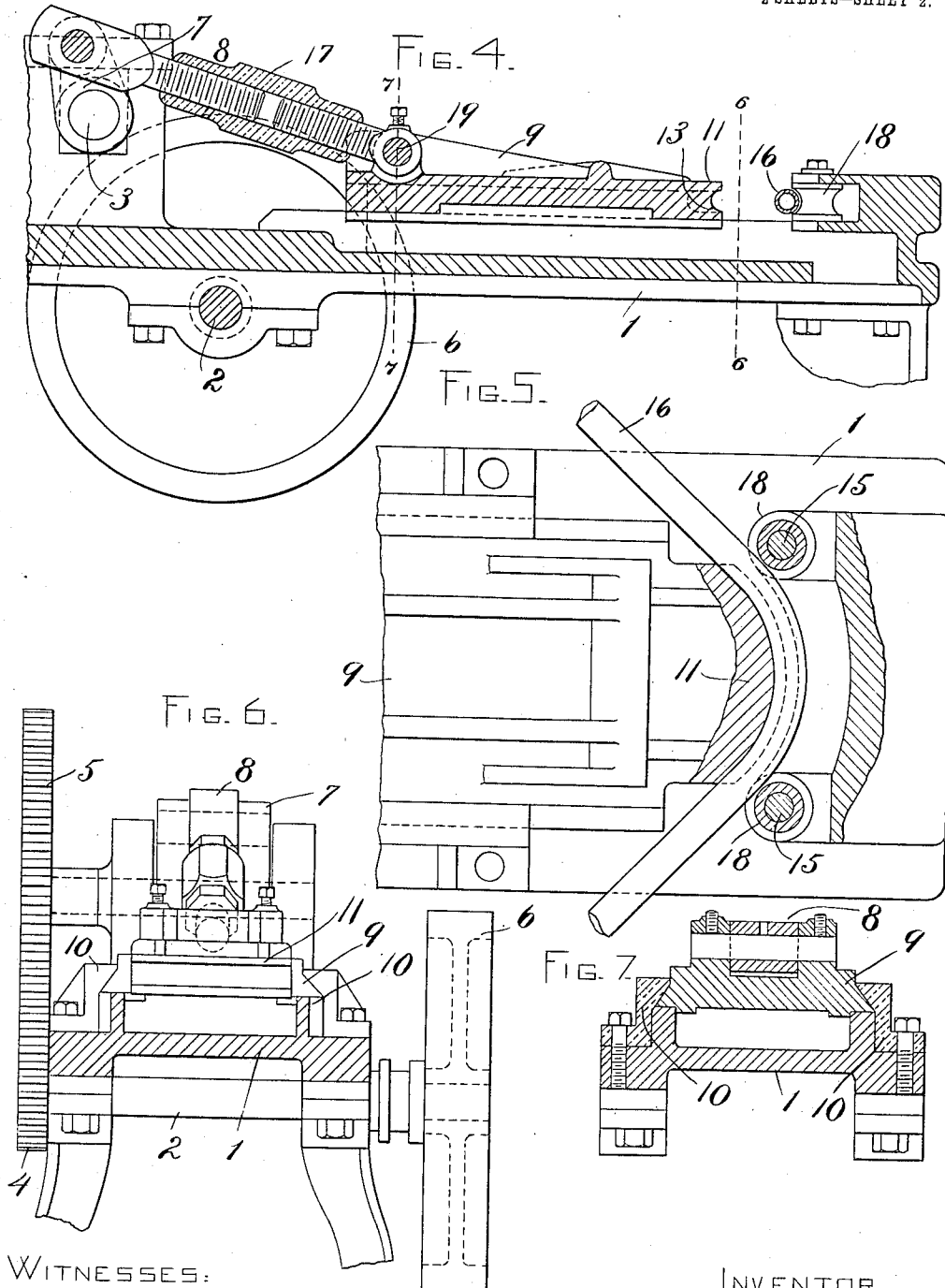
INVENTOR:
C. N. Brown
by Wright, Brown & Smith
Attorneys

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WITNESSES:
Addison C. Raleigh
P. H. Pezzetti

INVENTOR:
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UNITED STATES PATENT OFFICE.

CHARLES N. BROWN, OF BOSTON, MASSACHUSETTS, ASSIGNOR, BY MESNE ASSIGNMENTS,
TO AMERICAN CIRCULAR LOOM COMPANY, OF CHELSEA, MASSACHUSETTS, A CORPORATION OF MAINE.

PIPE-BENDING MACHINE.

No. 926,093.

Specification of Letters Patent.

Patented June 29, 1909.

Application filed July 9, 1902. Serial No. 114,919.

To all whom it may concern:

Be it known that I, CHARLES N. BROWN, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Pipe-Bending Machines, of which the following is a specification.

This invention relates to machines for bending pipe, and it consists in certain novel features of construction and arrangement of parts, which will be hereinafter fully described in the specification, clearly illustrated in the drawings, and particularly pointed out in the claims.

Reference is to be had to the accompanying drawings and the characters marked thereon, which form a part of this specification, like characters designating like parts or features, as the case may be, wherever they occur.

Of the drawings,—Figure 1 represents a top plan view of a pipe-bending machine constructed in accordance with my invention. Fig. 2 represents a side elevation thereof. Fig. 3 represents a section on line 3—3 of Fig. 2, looking in the direction of the arrow. Fig. 4 represents a longitudinal median section. Fig. 5 represents a plan view, partly in section, illustrating the position of the machine in bending the pipe. Fig. 6 represents a section on the line 6—6 of Fig. 4. Fig. 7 represents a section on the line 7—7 of Fig. 4.

Referring to the drawings—1 designates the frame or bed of the machine, the same being provided with suitable supporting legs or standards, and having bearings for a main drive-shaft 2 and a crank-shaft 3, the latter having a large gear 5 affixed to its end and meshing with a small gear or pinion 4, affixed to the end of the drive-shaft 2. The drive-shaft 2 is provided with a belt-pulley 6, which may be connected with the shaft 2 by means of a suitable clutch whereby the machine can be started and stopped at will.

The shaft 3 is provided, intermediate of its ends, with a crank 7, connected by a pitman 8 with a slide 9, the latter being mounted to reciprocate horizontally in guides 10, 10 on the machine bed 1. The pitman may, as shown, be formed in two oppositely-threaded sections joined by a nut 17, the whole forming a turn-buckle whereby the

relation of the bending dies may be adjusted or varied.

The front edge 11 of the slide 9 is convexed or curved outwardly, and constitutes a former, the shape of whose working face is determined by the amount or angle of bend which it is desired to give to the pipe. The slide 9 has integral strengthening ribs formed on its upper side, as shown, extending from one end nearly to the other, and the T-head of the pitman is journaled on a pin 19 held in said integral ribs; hence directness of thrust and accuracy of operation are insured.

18 18 represents two rollers loosely mounted on vertical studs 15 15 in the plane of movement of the former 11, said studs being supported by ears formed on a raised portion 14 of the machine bed integral therewith as shown. The rollers 18 constitute abutments adapted to engage the pipe (represented by 16 in the drawings) on the opposite side from the former 11, and separated by a space into which the bend of the pipe may enter. Owing to the rollers being mounted on studs which are, in turn, supported directly in ears integral with the machine bed itself, their fixed and rigid location relatively to each other and to the thrust of the former 11 is always positive and certain. The space between these roller abutments is of such depth that no pressure is exerted on the pipe between the abutments and opposite that side of the pipe which is acted upon by the former. Therefore the pipe is bent solely by the pressure of the former against one side thereof, such pressure acting on the pipe between the relatively immovable abutments, there being nothing which would have a tendency to compress or flatten the pipe by pressure against the opposite side thereof between said abutments. Both the former 11 on its working face 13, and the rollers 18 are grooved to conform to the cross-sectional curvature of the pipe. When the former and the rollers come together in their nearest approach they are separated by a space large enough to admit the diameter of the pipe. The primary function of the rollers 18, 18 is to act as abutments for the pipe, resisting at separate points the thrust of the former on the pipe, but permitting the pipe to bend freely between them and offering

no opposing surface to engage the pipe on the outer side of the bend. The secondary function of the rollers is to reduce friction during the bending operation.

5 In operating with my improved machine, a length of pipe 16 is placed horizontally between the dies, former 11 and the rollers 18, 18 when the former is retracted, and is preferably held against the rollers. As the
10 former is moved toward the pipe, by the revolution of the drive-shaft 2, transmitted through the gears and the crank and pitman to the slide 9, finally meeting the pipe, the latter is pressed between the rollers
15 18, 18, and in so doing, those portions of the pipe in contact with the rollers, partake of a limited longitudinal movement toward the center of the bend, which if the rollers were not present, would set up considerable
20 injurious friction. The rollers, however, rotate in obedience to this movement and hence avoid the friction. The former and rollers finally come together in the relation shown in Fig. 5, and complete the bending of
25 the pipe in conformity with the curvature of the former. The former then recedes and the bent pipe can be removed.

By means of my invention, I am enabled to attain greatly improved results in bend-
30 ing pipe.

It is obviously immaterial to the invention whether the relative movement of the former and abutments consists of a movement of the former only, or of the abutments
35 only, or of both former and abutments. It is to be noted that the grooving of the rollers and the former affords a kind of matrix or socket conforming to the cross-sectional curvature of the pipe and prevent-
40 ing the walls of the pipe from assuming an elliptical cross-section because of the bending stress.

Having thus explained the nature of my invention, and described a way of construct-
45 ing and using the same, though without attempting to set forth all of the forms in which it may be made, or all of the modes in which it may be used, I declare that what I claim, and desire to secure by Letters Pat-
50 ent is:—

1. A pipe-bending machine comprising a frame or bed, a slide having integral strengthening ribs on its upper side and mounted in suitable guideways on said bed, and having a working face convexed to conform to the inner side of the bend in a pipe and to shape the bend, a pitman having one end pivoted between and supported by said ribs, means for reciprocating the slide through the medium of said pitman, two
60 opposed abutments consisting of rollers having bearings in rigid integral portions of the bed and separated by a space into which the bend of the pipe enters, the working face of the slide and the peripheries of the rollers
65 being oppositely grooved to conform to the cross-sectional curvature of the pipe.

2. A pipe-bending machine comprising a frame or bed, a slide having integral strengthening ribs on its upper side and
70 mounted in suitable guideways on said bed, and having a working face convexed to conform to the inner side of the bend in a pipe and to shape the bend, a pitman having one end pivoted between and supported by said
75 ribs, means for reciprocating the slide through the medium of said pitman, two opposed abutments supported by rigid integral portions of the bed and separated by a space into which the bend of the pipe enters, the co-acting working face of the slide
80 and of the rigid abutment being oppositely grooved to conform to the cross-sectional curvature of the pipe.

3. A pipe-bending machine comprising
85 fixed abutments concaved to conform to the cross-section of the pipe and located with a free space between them to receive the bend of the pipe, an oppositely concave former and means to impart a relative movement of
90 said former with respect to said abutments into and out of the space between the abutments.

In testimony whereof I have affixed my signature, in presence of two witnesses.

CHARLES N. BROWN.

Witnesses:

P. W. PEZZETTI,
H. L. ROBBIN.