J. H. MANNING.

PROCESS OF PIPE FLANGING.

APPLICATION FILED MAY 22, 1911.

1,076,592.

Patented Oct. 21, 1913.

2 SHEETS—SHEET 1.

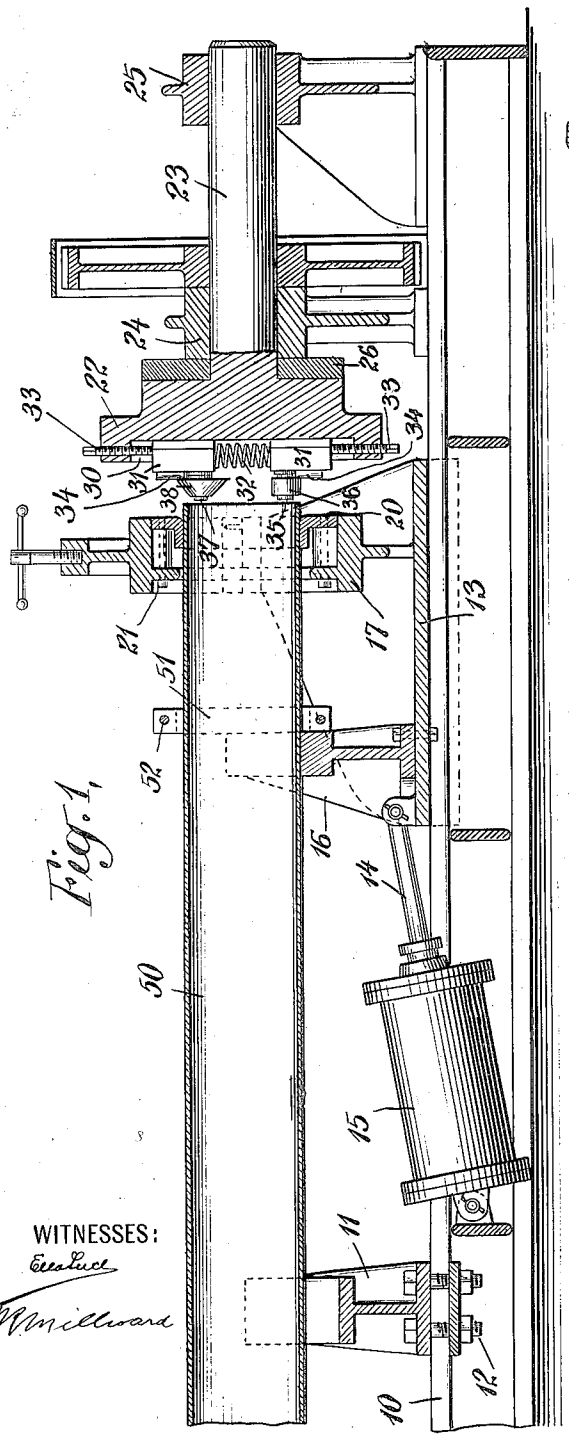


Fig. 1.

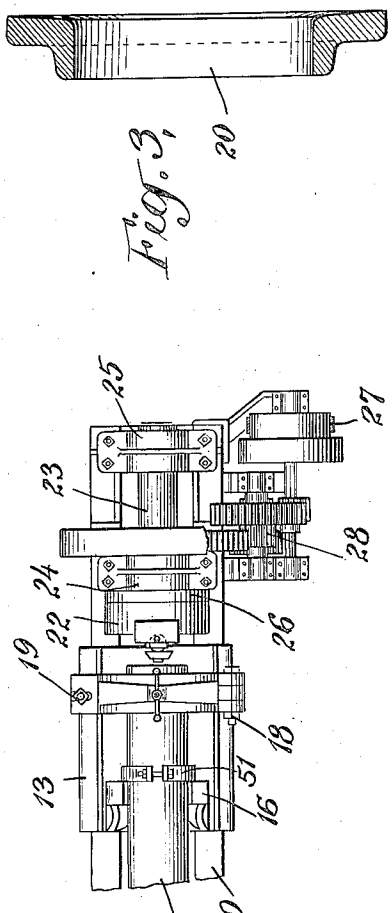


Fig. 2.

Fig. 3.

WITNESSES:

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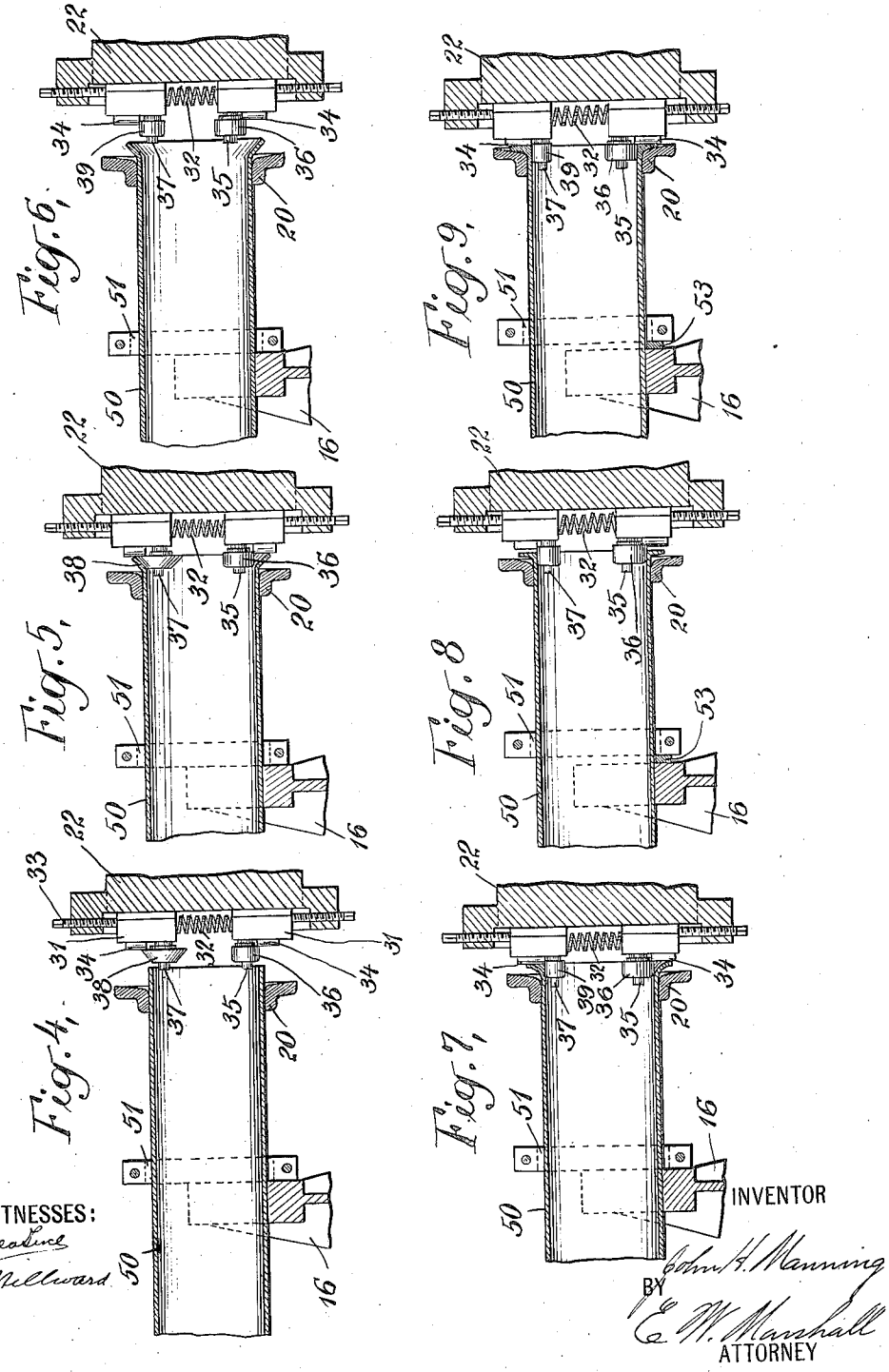
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UNITED STATES PATENT OFFICE.

JOHN H. MANNING, OF NEW YORK, N. Y., ASSIGNOR TO CRANE COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

PROCESS OF PIPE-FLANGING.

1,076,592. Specification of Letters Patent. Patented Oct. 21, 1913.

Original application filed November 23, 1910, Serial No. 593,767. Divided and this application filed May 22, 1911. Serial No. 628,824.

To all whom it may concern:

Be it known that I, JOHN H. MANNING, a citizen of the United States, and a resident of the borough of Brooklyn, in the county of Kings, city and State of New York, United States of America, have invented certain new and useful Improvements in Processes of Pipe-Flanging, of which the following is a specification.

My invention relates to a novel method or process of forming flanges on the ends of pipes of raw steel or other metal, and its object is to provide a simple and inexpensive way of forming better and stronger flanges than those heretofore made.

This application is divided from an application filed by me November 23rd, 1910, and bearing Serial Number 593,767.

I will describe my invention in the following specification and point out the novel features thereof in the appended claims.

Referring to the drawings, Figure 1 is a sectional side elevation of a machine for carrying out my invention. Fig. 2 is a plan view, on a reduced scale, of a portion of this machine. Fig. 3 is a cross-section of the forming mold. Fig. 4 shows certain parts of the apparatus and the end portion of a pipe in sectional elevation and on a somewhat enlarged scale, in the relative positions they assume at the beginning of the operation. Figs. 5, 6, 7, 8 and 9 are views of similar parts in different relative positions and illustrate my improved process.

Like characters of reference designate corresponding parts in all of the figures.

10 designates the base of the machine upon which its various parts are mounted. Secured to this base is a pipe-rest 11 which comprises a stand in which are adjustably held a pair of rollers upon which the pipe is supported. This pipe-rest itself may be moved longitudinally along the frame and secured thereto in desired positions by bolts 12.

13 is a carriage slidably mounted upon the base 10, a portion of which forms a longitudinal track therefor. 14 is a piston-rod which connects this carriage with a piston within a cylinder 15. One end of this cylinder is connected with the base of the machine. The piston and piston-rod are arranged to be actuated by fluid pressure manually controlled. By means of this arrangement the carriage 13 and its associated parts may be moved back and forth a limited amount along the tracks which are formed by the base 10. To the carriage 13 is bolted a stand or bracket 16. The upper portion of this bracket is formed to fit loosely under a pipe and to extend up at either side of it.

17 is a die or forming mold clamp which is rigidly secured to the carriage 13, or its base is an integral part thereof. This clamp is made in two parts, a base and a cap, which are pivoted together at 18 and arranged to be tightened by a bolt and nut at 19.

20 designates a forming mold which is circular in form but cut diametrically into a lower half which is held in the base of the mold clamp 17 and an upper half held in the cap of this clamp by means of set screws 21.

A rotary disk 22 on the end of a shaft 23 is supported in pedestal bearings 24, 25. Between the disk and the pedestal bearing 24 is a plate 26 which is arranged to take up end thrust. The shaft 23 may be driven by any suitable power mechanism, as, for example, by a belt 27 which is connected with it through reduction gearing 28. Across the face of the disk 22 is a housing 30 which forms a groove with undercut edges in which are supported a pair of slidable blocks 31, 31. Between these blocks is a compression spring 32. These blocks may be forced toward each other against the action of the spring and their positions, relative to the axis of rotation, may be adjusted by means of set screws 33, 33. In each of the blocks is supported a transverse cylindrical roller 34. The outside surfaces of these rollers are in alinement with each other and are at substantially right-angles to the axis of the shaft 23. Inside of the roller in one of the blocks is a pin 35 projecting from the face of the block. On this pin is a permanent roller 36, the forward edge of which is chamfered or rounded as shown, and its rear edge is arranged to overlap the roller 34. On the other block is a similar pin 37 on which is a removable flaring roller 38 which extends

over the face of the roller 34 in this block. During the process of flange-forming, this roller is removed and a smaller roller 39, which extends back of roller 34, is substituted therefor.

50 designates a pipe upon the end of which the flange is to be formed.

51 is a strap collar which fits tightly around the outside of the pipe. This strap is made in two parts fastened together by bolts and nuts at 52, by means of which it may be securely affixed to the pipe. The first part of the operation is to securely fasten this collar to the pipe with its edge which is away from the end of the pipe, at a desired distance from that end of the pipe which is to be formed into a flange. If the pipe is of wrought steel or similar metal this end of it is then heated, after which it is so placed in the machine that its end projects through the forming die or mold 20, and that the collar 51 abuts against the face of the stop-bracket 16. The die or mold is made in halves and its clamp so constructed that it may be opened to facilitate this part of the operation. The clamp is now closed and the die tightened by means of the bolt and nut at 19. The other part of the pipe will be supported on the pipe-rest 11. All of the parts are so adjusted that the pipe will be held with its axis in alinement with the axis of the shaft 23 and the parts will be in some such relative positions as those in which they are shown in Fig. 4. The operator now forces the carriage toward the rotating disk 22 and as the bracket 16 is in engagement with the collar 51 the pipe will move with it. Its heated end is then forced against the flaring roll 38 which bends it outward into some such form as that in which it is shown in Fig. 5. As soon as this is done the carriage is drawn back away from the rotating disk, the roll 38 is removed, and the cylindrical roller 39 substituted therefor. Fig. 6 shows the parts ready for the next step of the process of treatment. Again the carriage and pipe are forced toward the rotating disk. This time all of the rolls 34, 34, 36 and 39 will act upon the pipe as shown in Fig. 7, and force its end down against the forming mold. A flange of desired shape and size will thus be formed. But in order to perfect the flange and to increase its strength the process is carried on further. The carriage is again withdrawn and the mold 20 is loosened so that the flanged end of the pipe may be moved through the mold or die into some such position as that in which it is shown in Fig. 8. A bar or wedge 53 is then thrust between the collar 51 and the bracket 16, the mold is tightened, and the carriage is again advanced toward the rollers in the rotating disk. The metal will now be crushed between the mold and the rollers into the position shown in Fig. 9. This will result in upsetting the metal at the end of the pipe and at the angle between the pipe and the flange so as to increase its density and its strength. Before the pipe is taken out of the machine I prefer to run the carriage back enough to remove the pressure of the rollers, to loosen the mold and to remove the bar 53. Then the pipe is partially rotated so that the rear of the flange will come in contact with different portions of the mold than those against which it was formed, the mold is tightened and the carriage is again forced toward the rollers. Thus a finish pressure is applied which trues up the flange.

By carefully setting the position of the collar 51 at the beginning of the operation the finished flange will be of the desired thickness and diameter.

The spring 32 cushions the strain on the rollers 36, 38 and 39. In small pipes the roller 36 is dispensed with, but when it is used in conjunction with the roller 39 the pressures on these rollers is balanced and the spring allows them to move in toward the center of the disk when any roughness, such as a seam on the inside of a pipe, is first met. Such protuberance will be rolled down, however, during the process of flange-forming. It has been noted that the roller 36 overlaps one of the rollers 34 and that the roller 39 runs past the end of the other roller 34. By this construction the end of the pipe is left with a sharp clean edge.

When flanges are formed, according to this process, on the ends of pipes of some metals such as brass or copper it is not necessary to heat the metal.

It is only necessary, in order to carry out my invention, to impart a relative rotation between the pipe and the forming rollers. The roller which is used to flare the pipe is forced against the end thereof to perform its function. It is obviously immeterial whether the movement imparted to it for this purpose is longitudinal or radial. The collar 51 and the bracket 16 against which it abuts are provided for the purpose of insuring the longitudinal movement of the pipe with the carriage 13. The dies themselves may be used to perform this duty if it is desired.

The pipe flange formed by this process is extremely strong. It is also of sufficiently large diameter to make it very effective in forming various kinds of pipe joints. The fiber of the metal is nowhere bent over at a smaller angle than a right-angle. The flange is formed of the integral end of the pipe without any of its portions being folded together and welded so that in all places its grain or fiber is continuous. At the corner of the flange the cross-section of the metal is about twice as thick as that of

the pipe or of the flange proper. Moreover, at this point where the greatest strains come in use, the metal is upset and thereby condensed and strengthened.

What I claim is.—

1. The herein described process of forming pipe flanges comprising first bending outward into a cone-like shape the metal which forms the end portion of a pipe, and second in forcing back against a mold the said cone-shaped portion of the pipe by pressure applied in a direction parallel with the axis of the pipe, and supporting the interior of the end portion thus acted upon directly opposite the point of application of the pressure to cause said pressure to upset the metal of the pipe at the bend thus formed.

2. The herein-described process of forming pipe flanges comprising flaring the end of the pipe, pressing back against a mold the portion of the pipe thus flared, moving the flanged end thus formed relative to the mold, and again pressing the formed end back into the mold, thus upsetting the metal.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOHN H. MANNING.

Witnesses:
F. W. APPLETON,
IRA MOORE.