

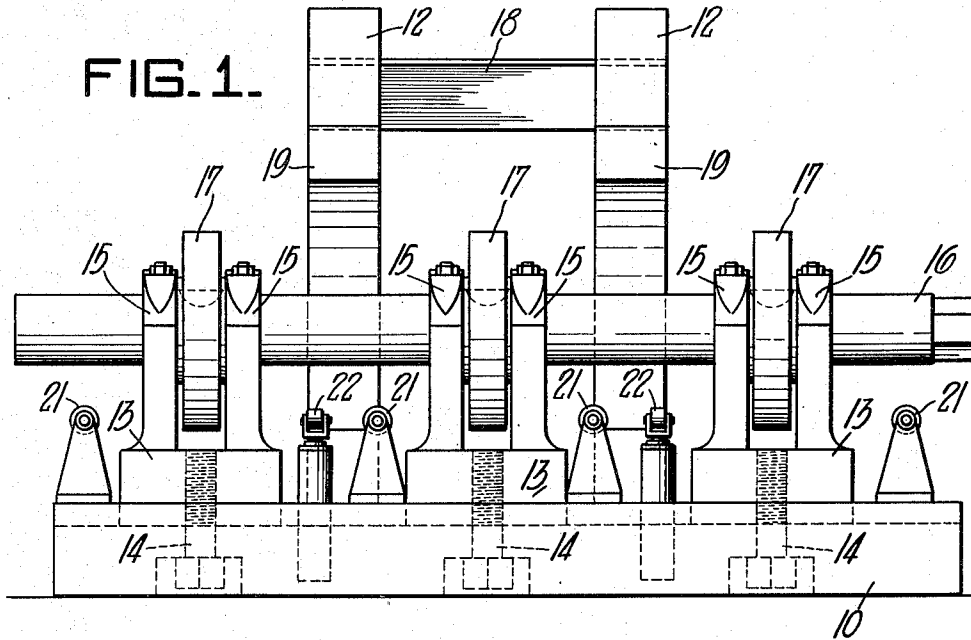
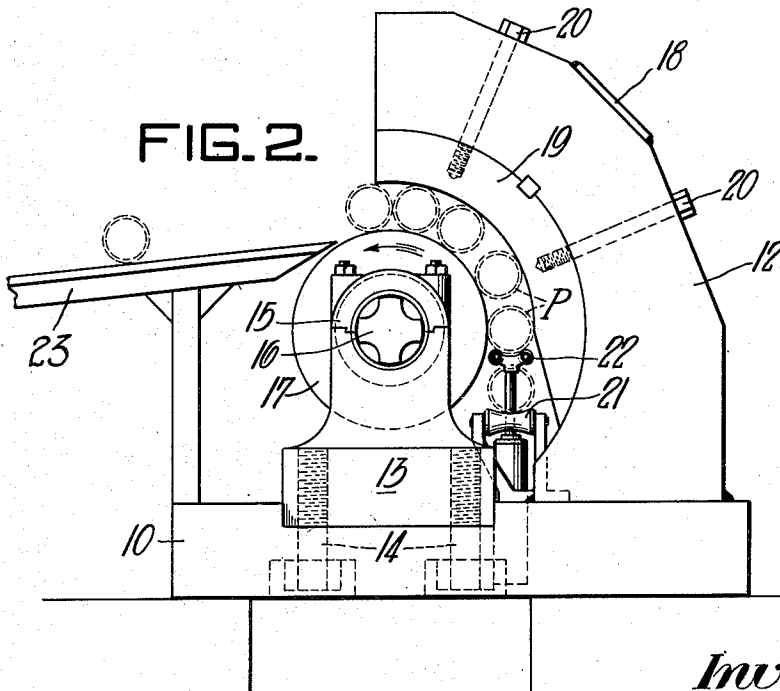
May 1, 1951

C. W. McCLURE ET AL
MACHINE FOR STRAIGHTENING PIPE

2,550,842

Filed June 25, 1948

2 Sheets-Sheet 1



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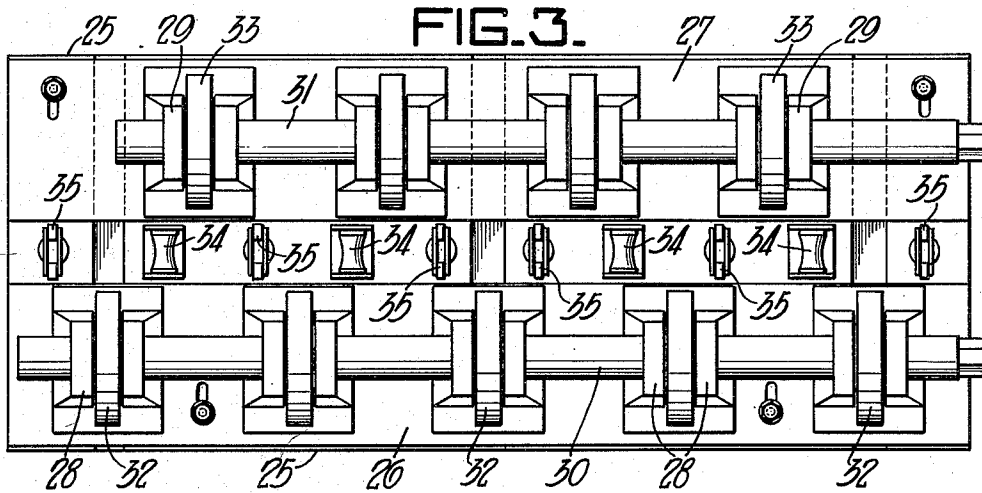
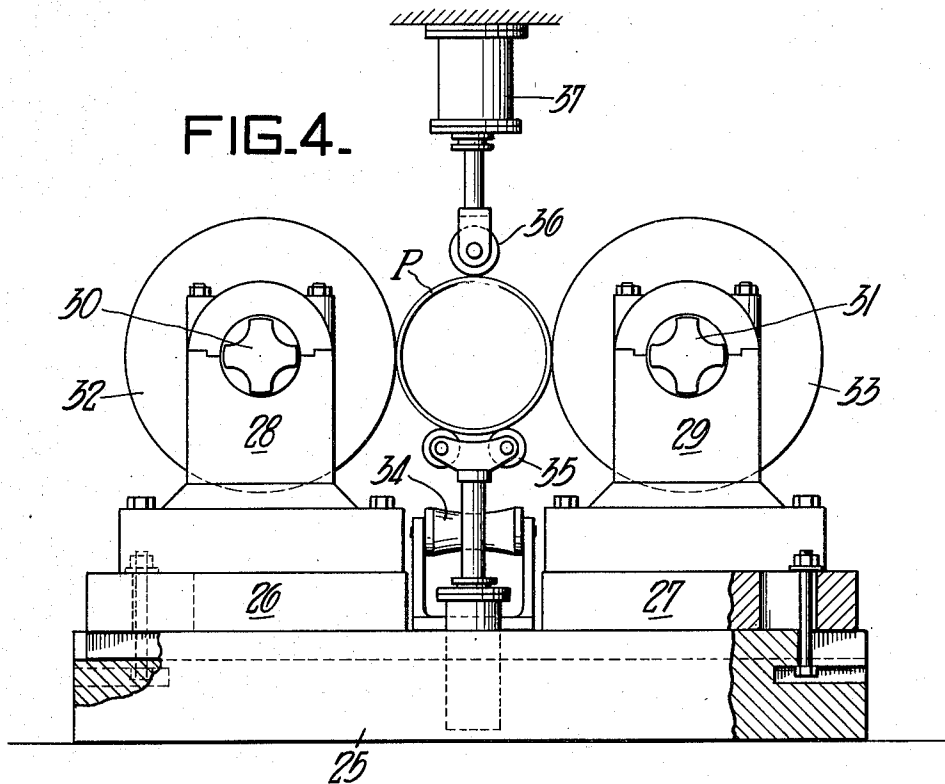
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UNITED STATES PATENT OFFICE

2,550,842

MACHINE FOR STRAIGHTENING PIPE

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Application June 25, 1948, Serial No. 35,096

2 Claims. (Cl. 153—32)

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This invention relates to machines for straightening pipe during its manufacture.

As a step in the manufacture of steel pipe, the pipe is subjected to a straightening operation, commonly either with a rotary straightening machine or a gag press. Rotary machines with which we are familiar straighten the pipe by bending it through a series of reverse bends. Such action has the disadvantage that the entire pipe is cold-worked, which may be undesirable. Gag presses engage the pipe at spaced points and remove the bends by proper application of lateral thrusts. Gag presses thus overcome the disadvantage of rotary machines, but those with which we are familiar are undesirably slow.

An object of the present invention is to provide improved pipe straightening machines that avoid any extensive cold-working pipe and yet are capable of rapid and continuous operation.

A further object of the invention is to provide improved pipe straightening machines that operate rapidly and continuously and yet straighten by application of lateral thrusts according to the principle of gag presses.

A further object of the invention is to provide improved machines for straightening pipe wherein pipe lengths are straightened by being bent to the elastic limit or beyond while rotating without being appreciably cold-worked.

In accomplishing these and other objects of the present invention, we have provided improved details of structure, preferred forms of which are shown in the accompanying drawings, in which:

Figure 1 is a side elevational view of an improved pipe straightening machine embodying features of the present invention;

Figure 2 is an end elevational view of the machine shown in Figure 1;

Figure 3 is a top plan view of a modified form of pipe straightening machine embodying features of the invention; and

Figure 4 is an end elevational view of the machine shown in Figure 3.

Referring more in detail to the drawings:

The pipe straightening machine shown in Figures 1 and 2 comprises a base 10, on which thrust means are carried for bending the pipe to its elastic limit or beyond, as hereinafter explained. The thrust means include a plurality of longitudinally spaced arms 12 upstanding from one edge of said base and affixed thereto as by welding, and a plurality of bearing blocks 13 upstanding from the mid-portion of said base staggered

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with respect to said arms and fixed to the base as by machine screws 14. Preferably each bearing block includes a pair of spaced bearings 15. Figure 1 shows two arms 12 and three bearing blocks 13, but obviously a larger number of arms and bearing blocks may be included where needed.

A power driven shaft 16 is rotatably mounted in bearings 15 and carries longitudinally spaced straightening rolls 17 between each set of bearings and in staggered relation to arms 12. The shaft rotates counter-clockwise as viewed in Figure 2. The upper edges of arms 12 preferably are joined by a horizontal brace 18. The lower edges of said arms are arcuate. Arcuate bearing shoes 19 are removably fixed to the lower edges of the arms as by machine screws 20. The arcs of said bearing shoes are substantially quadrants of a circle, the center of which coincides with the axis of shaft 16.

A series of conveyor rolls 21 are rotatably carried by base 10 between bearing blocks 13 and the lower portions of arms 12. A series of vertically movable jack rolls 22 are carried by the base in the longitudinal spaces between conveyor rolls 21 and preferably are hydraulically operated. Pipe lengths P are introduced to the straightening machine via conveyor rolls 21. They are then elevated via jack rolls 22 to a position where they are contacted by straightening rolls 17.

The face of bearing shoes 19 is radially spaced from the circumference of straightening rolls 17 by a distance sufficiently less than the outside diameter of pipe P that a straight pipe length passing between the rolls and the bearing shoes is bent approximately to its elastic limit. A pipe length that is not straight is thus bent beyond its elastic limit sufficiently so that its elasticity straightens it as it emerges from the machine.

It is seen that the straightening rolls and bearing shoes apply lateral thrusts to the pipe, similar to a gag press, although they do not move radially. The spacing between the straightening rolls and bearing shoes may be adjusted for different pipe diameters by changing the bearing shoes. Shims are used between the underfaces of the shoes and the faces of the arms to compensate for roll and shoe wear and to provide for adjustments due to pipe diameter variations. The diameter of straightening rolls 17 is at least four times the outside diameter of the pipe in order that rotation of the rolls through 90° rotates the pipe through at least one complete revolution.

When jack rolls 22 elevate the pipe into engagement with the straightening rolls, rotation

of the latter carries the pipe through at least one complete revolution. Since the straightening rolls and bearing shoes contact the pipe and apply lateral thrust forces thereto at spaced apart points and thus bend the pipe to its elastic limit or beyond, such contact through one or more complete revolutions of the pipe effectively removes any bends. As illustrated in Figure 2, several successive pipe lengths may be straightened simultaneously, thus further expediting the operation.

After clearing the bearing shoes and straightening rolls, the pipe is discharged on a receiving table 23 for further operations in its manufacture.

It is possible also to operate the machine in reverse. That is, pipe may be introduced to the machine at the upper edge of the bearing shoes and discharged at the lower end onto conveyor rolls 21.

In the modified form of pipe straightening machine shown in Figures 3 and 4, both thrust means are rolls, rather than a straightening roll and a bearing shoe. The machine comprises a base 25, which carries an axially aligned set of bearing blocks 26 and a second axially aligned set of bearing blocks 27. The two sets of bearing blocks are laterally spaced and are in staggered relation. Said bearing blocks each comprise sets of bearings 28 and 29 respectively. A power driven shaft 30 is rotatably supported in bearings 28. A shaft 31, which may be either power driven in synchronism with shaft 30 or idling, is rotatably supported in bearings 29. Shafts 30 and 31 carry straightening rolls 32 and 33 respectively between their bearings. The straightening rolls thus are in laterally spaced staggered relation, the spacing being sufficient to bend a straight pipe length approximately to its elastic limit as in the first embodiment. The machine may be adjusted for different pipe diameters by varying the lateral spacing between bearing blocks 26 and 27.

A series of rotatable conveyor rolls 34 are carried by the base between bearing blocks 26 and 27 and a series of jack rolls 35 are carried by the base between said conveyor rolls. Pipe lengths P are introduced to the machine via the conveyor rolls and jack rolls as in the first embodiment. One or more upper bearing rolls 36 are carried by supports 37 from above and bear on the surface of pipe.

Jack rolls 35 and upper bearing rolls 36 cooperate to retain the pipe between the straightening rolls as shown in Figure 4. The pipe is maintained in this position through at least one revolution, after which jack rolls 35 are lowered and the pipe is removed from the machine. As in the first embodiment, bending of the pipe to its elastic limit or beyond through one or more complete revolutions effectively removes any bends.

It is seen that in both embodiments of the invention the pipe is straightened by bending to its elastic limit or beyond in a very expeditious fashion. There is no appreciable cold-working of the pipe, except that incident to straightening the bends. Thus both embodiments of the machine straighten pipe according to the principle of the gag press and yet overcome the disadvantage of slow operation. Although the machine is described for straightening pipe, it is apparent the same machine could be used for straightening

other elongated cylindrical articles, such as steel bars. Therefore we do not wish to exclude other uses to which the machine may be applied.

The present invention also embraces the novel method of straightening pipe by rotating the pipe through at least one revolution while simultaneously applying lateral thrust forces to opposite sides of the pipe at staggered points, thus bending the pipe to or beyond its elastic limit.

While we have shown and described only certain embodiments of the invention, it is apparent that further modifications may arise. Therefore, we do not wish to be limited by the disclosure set forth but only by the scope of the appended claims.

We claim:

1. A straightening machine for elongated cylindrical articles comprising a base, a plurality of longitudinally spaced arms upstanding from said base, arcuate bearing shoes on said arms adapted to contact the side walls of articles at longitudinally spaced apart points in a single line, bearings carried by said base, a power driven shaft rotatably carried by said bearings, the center of the arcs of said bearing shoes coinciding with the axis of said shaft, and longitudinally spaced straightening rolls carried by said shaft in staggered relation to said bearing shoes adapted to contact longitudinally spaced apart points in a single line on the diametrically opposite side of the article intermediate the points of contact of said bearing shoes and to rotate the article against said bearing shoes through at least one revolution of the article.

2. A straightening machine for elongated cylindrical articles comprising a base, a plurality of longitudinally spaced arms upstanding from said base, arcuate bearing shoes removably fixed on said arms adapted to contact the side walls of articles at longitudinally spaced apart points in a single line, bearings carried by said base, a power driven shaft rotatably carried by said bearings, the arcs of said bearing shoes being substantially quadrants of a circle, the center of which coincides with the axis of said shaft, longitudinally spaced straightening rolls carried by said shaft in staggered relation to said bearing shoes adapted to contact longitudinally spaced apart points in a single line on the diametrically opposite side of the article intermediate the points of contact of said bearing shoes and to rotate the article against said bearing shoes through at least one revolution of the article, and means on said base for conveying and elevating articles to a position for contact with said bearing shoes and said straightening rolls.

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