May 16, 1944. I. A. COLBY 2,348,786

PIPE FEEDING APPARATUS

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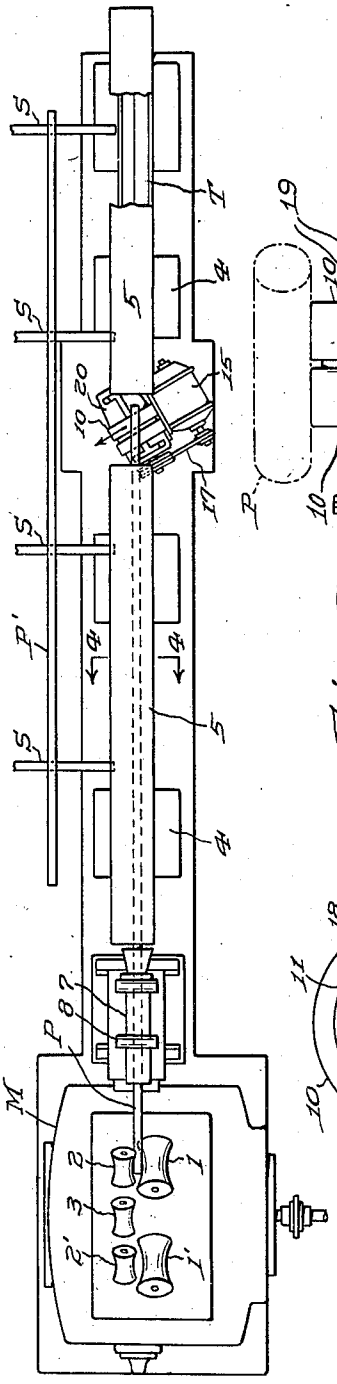


Fig. 1.

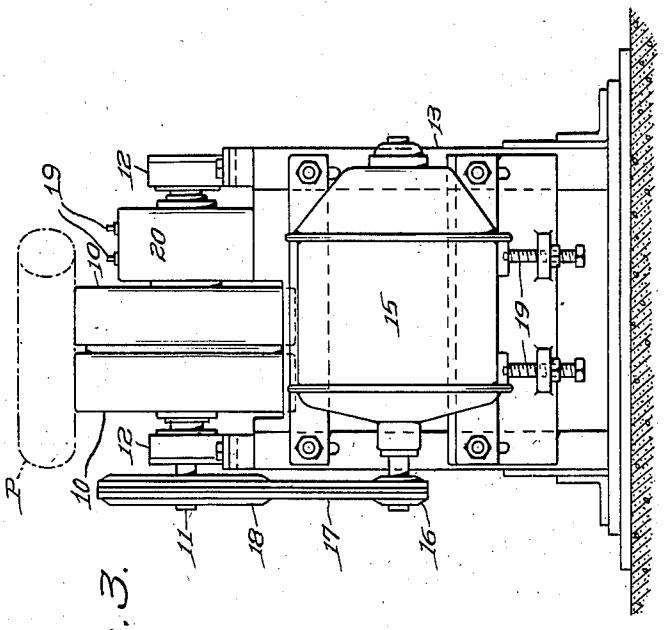


Fig. 3.

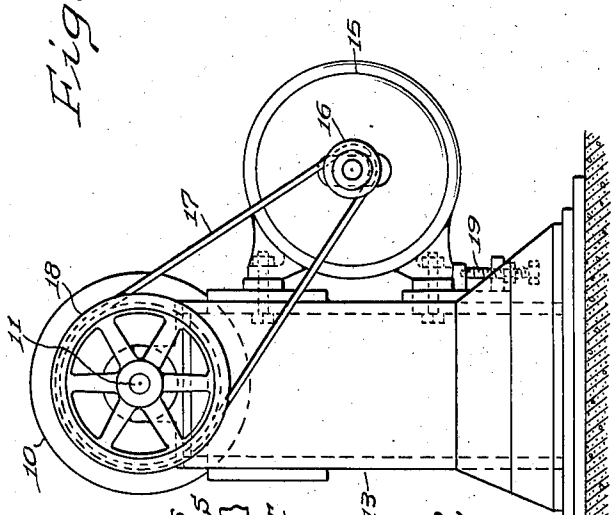


Fig. 2.

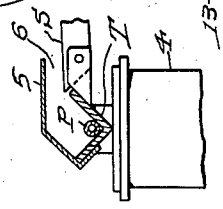


Fig. 4.

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PIPE FEEDING APPARATUS

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5 Claims. (Cl. 153—60)

Pipes and tubes are customarily straightened during production by passing them through a straightening machine which consists essentially of a pair of driven rolls respectively associated with idler rolls and so arranged as to simultaneously rotate and axially advance the pipe, and a pressure roll which performs the straightening operation. With the higher speeds now used in straightening machines it has been found that the action of the straightening machine rolls tends to swedge down the leading end of the pipe if it is simply moved axially into them and to negative this tendency it has been the practice to position along the feed table in advance of the straightening machine a series of longitudinally spaced roll stands having skewed rolls, each stand being separately driven by a motor or the like, which are effective because of the angular disposition of their rolls to both rotate and feed the pipe axially toward the machine so that it is rotating when it enters the latter. While this arrangement does eliminate flattened pipe ends, it is unsatisfactory because of the high initial cost of the several roll stands and the expense entailed in keeping them in proper operative condition, which is heightened by the fact that after the leading end of the pipe enters the straightening machine, its trailing end tends to whip about as it moves along the feed table and thus subjects the roll stands to excessive wear and tear.

These objections inherent in the present practice are obviated by my invention since the initial cost and complication of apparatus constructed in accordance therewith is materially less than when a plurality of feed roll stands are provided, the expense entailed in maintaining it in proper working condition is curtailed and the wear and tear upon the single feed roll employed is but relatively slight since it is in contact with the pipe only a short time after the leading end of the latter has entered the straightening machine.

It is therefore an object of my invention to provide a novel pipe feeding apparatus operative to rotate and axially move a pipe into a straightening machine or the like.

Another object is the provision of pipe feeding apparatus embodying magnetic pipe translating and rotating means.

A still further object is the provision of such apparatus comprising an angularly disposed roll and mechanism for magnetizing and driving said roll to cause it to translate and rotate a pipe when engaged therewith.

Other objects of the invention are to dispense with the customary employment of a plurality of independently driven roll stands for rotating and feeding the pipe to the straightener; to provide pipe feeding and rotating apparatus which can be installed and maintained at less cost than prior mechanisms for performing the same function and which is simple in construction and not liable to get out of order under the duty to which it is necessarily subjected.

Still other objects, advantages and novel features of design, construction and arrangement comprehended by the invention are hereinafter more particularly pointed out or will be apparent to those skilled in the art from the following description of one embodiment thereof as illustrated in the accompanying drawing.

For convenience I shall herein more particularly refer to the employment of my invention in operative combination and association with a pipe straightening machine but it is to be understood that it may be used with equal facility and advantage for rotating and feeding pipes into other machines or mills such as reelers, piercing mills, sizing mills or the like and, further, that by the term "pipe" I intend to include not only the articles commonly referred to as such but tubes and other elongated articles as well.

In the said drawing,

Fig. 1 is a top plan diagrammatic view of my improved feeding apparatus in operative combination and association with a straightening machine;

Fig. 2, on a much larger scale, is an end view of a portion of said apparatus;

Fig. 3 is a front view thereof, and

Fig. 4 is a fragmentary vertical section on line 4—4 in Fig. 1 on a scale slightly larger than the latter.

More specifically and referring first to Fig. 1, the straightening machine M to which the pipes are consecutively fed is of ordinary construction and thus comprises the driven rolls 1, 1' respectively associated with idler rolls 2, 2' and a pressure roll 3 which straightens the pipe as it is rotated and drawn through the mill by the combined action of the other rolls and idlers, straightening machines of this general character being well known and in common use.

In accordance with my invention the apparatus associated with and by which the pipes are conveyed to the machine M comprises a feed table T desirably V-shaped in cross section, mounted on suitable standards or pedestals 4 and adapted to support the pipe during its passage to the machine from which it is ultimately ejected after

clearing rolls 1', 2' following completion of the straightening operation. Extending transversely from the table are downwardly inclined skids S or other means by which the pipes P, P' are consecutively transferred to it preparatory to their passage to the straightening machine, the skids terminating closely adjacent the proximate edge of the table in such relation to the latter that the pipes can readily roll into it from the skids. To prevent the pipe after it reaches the table from getting materially out of proper position therein, the table, which may be made of angle iron or the like, is preferably provided with a cover 5, as best shown in Fig. 4, which may consist of a plate fastened to the outer face of the table remote from the skids and thence extending angularly upward from its adjacent edge and finally horizontally so as to overlie its other edge and the ends of the skids yet at a sufficient distance thereabove to leave an opening or throat 6 of adequate height to allow the pipes to pass freely therethrough from the skids into the trough-like table. A tubular guide 7 mounted on supports 8 is disposed between the table and the straightening machine so as to properly direct the pipe into the latter.

The table is interrupted at a suitable point in its length to provide space for a magnetic roll 10 and its associated driving and energizing mechanism, these parts being shown in greater detail in Figs. 2 and 3. The roll is conveniently about 16" in diameter and 9" in width though other sizes of rolls may be employed if desired; it is mounted on a shaft 11 journaled in bearings 12 supported on a suitable pedestal generally designated as 13, the base of which rests upon the floor, and which supports a driving motor 15 whose shaft carries a pulley 16 connected by a belt, rope drive or the like 17 with a larger pulley 18 on shaft 11, the relative diameters of the two pulleys being such as to afford a material speed reduction between the motor and the magnetic roll. The latter, however, should be driven fast enough to move the pipe along the feed table, as hereinafter described, at relatively high speed as, for example, 400 feet per minute for smaller sizes of pipe, such as ½", and usually at somewhat lesser speeds for those of greater diameter. To facilitate adjustment of drive means 17 the motor may be arranged, as illustrated, for vertical adjustment on the pedestal through the medium of adjusting screws 19 or in any other convenient manner. Other adjustments may also be provided to synchronize forward and rotative speed with the straightener speed.

Current for energizing roll 10 is furnished in the usual way through suitable leads 19 and is taken to the roll by brushes and a collector ring (not shown) enclosed in a housing or shield 20, with the result that when so energized the roll is operative to magnetically grip a pipe P or other ferrous article after transfer to the feed table T from skids S and, if the roll be revolving, to correspondingly rotate the pipe. In order to impart to the pipe when so positioned on the table a movement of axial translation as well so as to feed it toward machine M, the axis of the roll is arranged at an angle to the center line of the table and by varying this angle the rate of longitudinal feed of the pipe can be altered. The angle included between the axis of the roll and the axis of the table, as shown, is in the neighborhood of 30° which approximates the angularity usually employed and the roll is arranged to turn in the direction of the arrow in Fig. 1, it being of course appreciated that the roll is so adjusted as to height that it will suitably engage the pipe when the latter is resting in the trough-like table.

The pipes follow each other consecutively down skids S and it will be noted the position of the roll and its associated mechanism is such with relation to the table, the straightening machine and the path followed by the pipes as they move to the former that after each pipe reaches the table and is then caused to rotate and move axially by the roll, its trailing end will clear the roll shortly after its leading end has been gripped by the rolls of the straightening machine which thereafter are effective to rotate and translate the pipe; it results that even though the trailing end of the pipe whips about as it is revolved and drawn forward by the straightening machine, the magnetic roll and associated parts cannot be damaged by it since the roll is in contact with the pipe only during that relatively small part of the total of its axial travel required to bring its leading end into the grip of the straightening machine rolls. Consequently, by my invention the maintenance expense entailed through injury caused to the several strands of feed rolls, heretofore customarily employed, by the whipping about of the trailing end of the pipe is substantially eliminated, for in my improved apparatus the simultaneously axial translation and rotation of the pipe is effected solely by the magnetic roll and the pipe clears the latter entirely at a very short interval after the whipping action, if any, is initiated.

It will of course further be appreciated that the specific construction of the magnetic roll 10 and its associated mechanism forms no part of the invention and is therefore a matter of choice so long as the roll is of such character and so positioned as to height and angularity than it is effective for the performance of its intended function, namely, to magnetically grip the pipe when it is brought into overlying relation to the revolving roll and then, through its own rotation, to simultaneously rotate the pipe and feed it axially toward the straightening machine until the latter in turn becomes effective to impart like movements to the pipe as it passes therethrough.

It will be observed that my invention permits the use of a trough-like table, interrupted only at the point at which the magnetic roll is disposed, for supporting and guiding the pipe to the straightening machine. Such a table can be constructed of the simplest elements at low cost, affords substantially continuous support to the pipe and when worn can be readily and inexpensively replaced, while it tends to restrain vibration in the pipe as it is passing thereover and consequently excessive whipping and wear. Moreover, the employment of the magnetic roll is of material advantage in that, among other things and unlike the customary skew-rolls, it gives an immediate pick-up and virtually eliminates any slip between the pipe and its driving and rotating means, in this case the roll. It thus enables proper synchronization between the feed of the pipe and the operation of the straightening machine to be readily maintained even with the smaller sizes of pipe which because of their comparatively light weight are difficult to rotate or feed with plain rolls.

It has therefore been found under practical conditions of operation that my invention effects a marked improvement over the prior practice of rotating and feeding the pipe by a plurality of independent roll stands associated with the feed table, for it not only effectually eliminates swedging down of the pipe ends in the straightening

machine but reduces direct installation and maintenance expense and increases the productive capacity of the mill as a whole by eliminating delays due to shutdowns while repairs are being made.

While I have herein described with considerable particularity one embodiment of my invention in operative combination and association with a pipe straightening machine, it will be understood that, as above mentioned, the invention may be employed with equal facility in like combination and association with other machines and further, that the details of construction and arrangement of the various elements utilized in its practice are capable of wide variation without departing from the spirit and scope of the invention as defined in the appended claims.

Having thus described my invention, I claim and desire to protect by Letters Patent of the United States:

1. In pipe feeding apparatus, an elongated trough for supporting, confining and guiding the pipe and having a lateral opening for passage of the pipe thereinto, means for directing a pipe through the opening, a roll positioned adjacent one end of the trough with its axis at an angle to the axis thereof, means for supporting the roll at a height to engage the under side of the pipe when it is resting in the trough, means for magnetizing the roll, and means for driving the roll to thereby simultaneously rotate the pipe and move it axially in the trough away from the roll.

2. In combination, a straightening machine adapted to grip and then rotate and axially translate a pipe to straighten it, a feed table disposed in advance of said machine, means for transferring a pipe to said table and means for simultaneously rotating and axially moving the pipe therealong at speeds coordinated with those to be imparted to it by the straightening machine until the pipe is gripped by the latter, said means comprising a magnetizable roll spaced from the straightening machine a distance less than the length of the pipe with its axis forming an angle to the table axis, means for magnetizing the roll, and means for driving the roll when magnetized.

3. In combination, a straightening machine comprising mechanism adapted to grip the leading end of a pipe when moved thereinto and to then rotate and axially translate the pipe at predetermined speeds, and means for consecutively feeding pipe to said machine comprising an elongated feed table adapted to limit movement of the pipe in directions normal to its axis, means for transferring a pipe thereto, a magnetizable roll so positioned as to engage the pipe adjacent its trailing end when received on the table and having its axis at an angle to the pipe axis, means for magnetizing the roll, and means for driving the magnetized roll in a direction to rotate and move the pipe into the machine at speeds coordinated with those to be imparted by the latter.

4. In combination, a pipe straightening machine comprising mechanism adapted to grip the leading end of a pipe when moved thereinto and to then rotate and axially translate the pipe and means for feeding a pipe to said machine comprising an elongated covered trough for confining and guiding the pipe and having a lateral opening for admitting the pipe to its interior, means for directing a pipe through said opening, a magnetizable roll so positioned as to engage the pipe adjacent its trailing end when received in the trough and having its axis at an angle to the latter, means for magnetizing the roll, and means for driving the magnetized roll in a direction to rotate the pipe and simultaneously move it forwardly in the trough until its leading end is gripped by the machine, the roll being so disposed with respect to the latter and the trough that the trailing end of the pipe clears the roll substantially as its leading end is so gripped.

5. In combination, a pipe straightening machine comprising mechanism adapted to grip the leading end of a pipe when moved thereinto and to then rotate and axially translate the pipe at predetermined speeds of rotation and progression, means for feeding a pipe to the gripping mechanism including an elongated feed table comprising a covered trough adapted to receive and confine the pipe, means for directing a pipe into said trough, a magnetizable roll so positioned with respect to the trough as to engage the pipe adjacent its trailing end as it is received in the trough and having its axis at an angle to the pipe axis, means for magnetizing the roll, and means for driving the magnetized roll in a direction to rotate the pipe and simultaneuosly move it forwardly along the trough at speeds respectively substantially corresponding to said predetermined speeds until its leading end is gripped by said mechanism, the distance between the roll and said mechanism being only slightly less than the length of the pipe whereby the ends of the latter are respectively in simultaneous engagement with said mechanism and the roll during but a small part of the axial movement of the pipe in the trough.

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