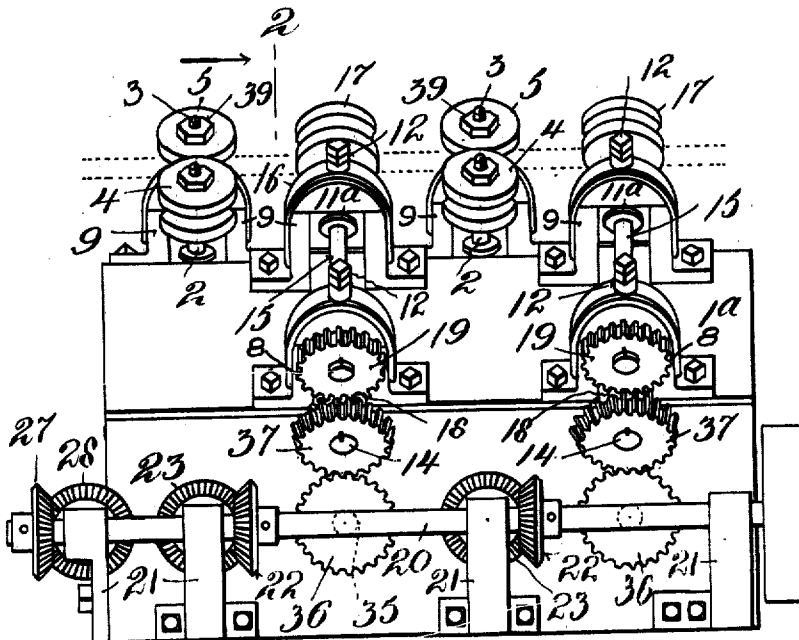
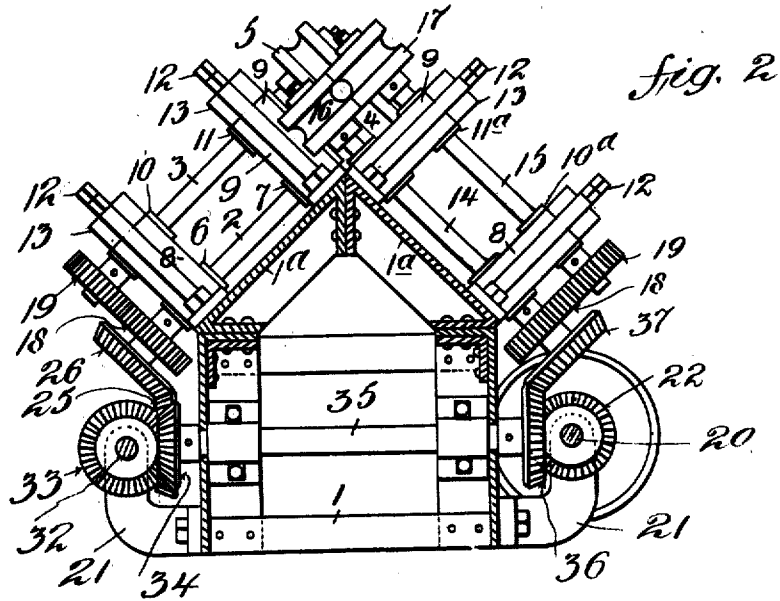


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METHOD OF REMOVING SCALE FROM METAL PIPES.
APPLICATION FILED NOV. 13, 1907.

931,897.

Patented Aug. 24, 1909.

2 SHEETS—SHEET 1.



Witnesses:
E. J. Thompson
M. J. Wright

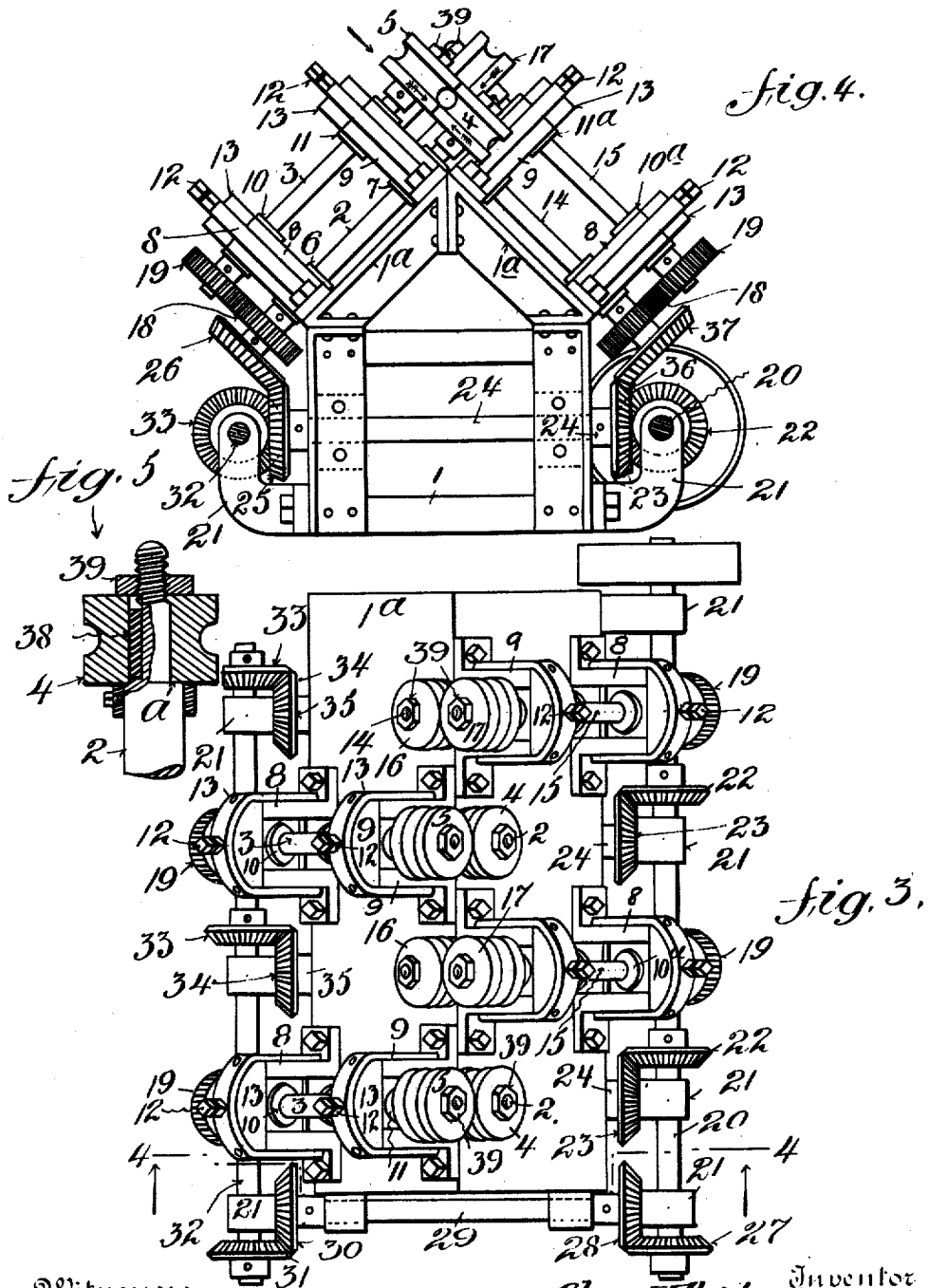
Inventor
Chas. Thibodeau.
By J. F. Bourne

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Witnesses:
C. W. Dugan
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Inventor
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UNITED STATES PATENT OFFICE.

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METHOD OF REMOVING SCALE FROM METAL PIPES.

931,897.

Specification of Letters Patent. Patented Aug. 24, 1909.

Application filed November 13, 1907. Serial No. 401,941.

To all whom it may concern:

Be it known that I, CHARLES THIBODEAU, a citizen of the United States, and resident of Chelsea, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Methods of Removing Scale from Metal Pipe, of which the following is a specification.

The object of my invention is to loosen or remove the scale from the exterior of metal pipes or tubing while at the same time retaining as nearly as possible the original diameter of the pipe or tubing being treated, and also to prevent flat surfaces or places from being formed in the pipe while being treated, and to retain its original form.

In carrying out my invention I provide a suitable frame or support upon which are mounted a plurality of pairs of grooved rolls having the passes between them aligned, with means for rotating said rolls at a uniform rate of speed, and means for causing said rolls to exert uniform pressure upon the pipe passing between them all so arranged that the first pair of rolls will act by pressure upon the pipe passing between them to loosen the scale on the exterior and interior of the pipe, while the remaining pair or pairs of rolls act upon the pipe to remove any flat surfaces or places produced in the pipe by the first pair of rolls, said remaining rolls serving also to keep the pipe straight. To remove any flat places in the pipe that may have been formed therein by the first or scale-loosening pair of rolls, I arrange the rolls in such manner that the axes of the second pair of rolls extend substantially at a right angle to the axes of the first pair of rolls, and so on, the axes of each pair of rolls being substantially at right angles to the axes of an adjacent pair of rolls, all whereby as the pipe passes from the first or scale-loosening pair of rolls any flat places that may have been formed in the pipe by said rolls will be removed by the subsequent pair or pairs of rolls by reason of the different angular relation of the pairs of rolls to each other. By locating the said rolls with their axes at an angle as above described, I am further able during the cleaning operation to preserve the circular form of the pipe in cross-section. This is an essential feature in a commercial conduit for insulated wires. In practice it is necessary for the sake of economy to use a conduit of as small diameter as will accommodate the insulated con-

ductor which is cylindrical in form with a covering that can be readily abraded and injured by violence. It is obvious therefore that any material flattening of the conduit in the process of cleaning would either result in injury to the covering of the conductor or require the use of a conduit of excessive diameter.

Reference is to be had to the accompanying drawings forming part hereof, wherein, 65

Figure 1 is a side view of an apparatus embodying my invention, Fig. 2 is a cross section on the line 2, 2, in Fig. 1; Fig. 3 is a plan view; Fig. 4 is a section on the line 4, 4, in Fig. 3, and Fig. 5 is a sectional detail of 70 a detachable roll.

In the drawings the numeral 1 indicates a suitable frame or support whose upper portion or bed 1^a is shown in substantially rectangular form with the apex pointed upwardly. Upon one side of the bed 1^a are shafts 2, 3, one above the other, supported in bearings so as to be inclined to the vertical, and said shafts carry at their upper ends grooved rolls 4, 5, between which the pipe or tubing to be treated is to be passed. Said shafts are supported in suitable bearings upon bed 1^a, the bearings 6, 7, of shaft 2 being stationary, while the bearings of shaft 3 are adjustable to permit said shaft to move toward and from shaft 2. For this purpose I have shown uprights 8, 9, secured on bed 1^a and provided with bearings or journal boxes 10, 11 of any suitable construction adapted to move in the uprights or guides 8, 9, and receiving shaft 3, screws 12, meshing in threads in yokes 13 on the uprights or supports 8, 9, and acting upon the boxes or bearings 10, 11, serving to permit adjustment of shaft 3 laterally as required. At a suitable distance from the rolls 4, 5, and located on the opposite side of bed 1^a, are upwardly inclined shafts 14, 15, located substantially at right angles to shafts 2, 3, and carrying at their upper ends grooved rolls 16, 17 corresponding to rolls 4, 5, but having their axes at substantially right angles to the axes of rolls 4, 5, with the pass or space between the rolls 16, 17 aligned with the pass between rolls 4, 5, to receive the pipes or tubing passing from the latter. The shafts 14, 15 are supported in suitable bearings in manner the same as described with respect to shafts 2, 3, the shaft 15 having adjustable bearings 10^a, 11^a, controlled by 110

screws 12 in manner similar to that described with respect to shafts 2, 3.

Any suitable number of pairs of rolls may be provided for the purpose having the 5 passes between the rolls alined, the pairs of rolls being in relatively close proximity to each other as illustrated, and the arrangement of the adjustable shafts is such that uniform pressure of all the rolls may be exerted upon the pipe being treated, whereby 10 the first pair of rolls will be adjusted to exert sufficient pressure upon the pipe passing between them to loosen the scale on the exterior and interior of the pipe with slight alteration of the diameter of the pipe, and 15 whereby the second pair of rolls, while exerting the same pressure on the pipe as the first pair of rolls, the pressure of the pipe by the different pairs of rolls being in lines of direction at right angles to each other 20 has no further tendency to reduce the size of the pipe, but serves to remove any flat places that may have formed in the pipe by the first pair of rolls and to keep the pipe straight. Where more than two pairs of 25 rolls are used the axes of adjacent pairs of rolls are arranged substantially at right angles to each other, as shown in Fig. 2, where I have shown four pairs of rolls arranged to 30 operate in manner set forth respecting rolls 4 and 5 and their shafts 2 and 3, whereby the adjustable shafts of all the pairs of rolls may be similarly adjusted to cause their respective rolls to exert uniform pressure upon 35 the pipe.

All the rolls are to rotate in a forward direction and at the same surface speed so as to carry the pipe or tubing between them from one end to the other, and the corresponding pairs of shafts are geared together 40 so that their adjoining surfaces will respectively rotate substantially as shown by the arrows in Fig. 4. For this purpose I have shown gears 18, 19 on the pairs of shafts 45 and respectively meshing as shown, and of equal diameter to cause the surface speeds of the rolls to be the same. To drive all the rolls and their shafts in the same direction at the same speed I have shown a drive 50 shaft 20 journaled in suitable bearings 21 on frame 1 and carrying gears 22 meshing with gears 23 carried by shafts 24 extending across frame 1 and supported in suitable bearings and carrying at their opposite ends 55 each a gear 25 meshing with a gear 26 on shafts 2 to drive the upwardly inclined shafts on the side of the frame opposite shaft 20. Upon shaft 20 is also secured a gear 27 that meshes with a gear 28 secured on cross shaft 29 journaled in frame 1, which shaft 60 29 carries a gear 30 meshing with a gear 31 secured on a shaft 32 journaled in frame 1 on the side opposite shaft 20. Secured to shaft 32 are gears 33 that mesh with gears 34 secured on shafts 35 journaled in and extend-

ing across frame 1. Shafts 35, at their ends opposite gears 34, carry gears 36 that mesh with gears 37 secured on shafts 14. The arrangement of the gearing shown is such that 70 when shaft 20 is rotated in a suitable direction the gears operated thereby will simultaneously rotate the shafts of the rolls 4, 5, 16, 17 etc. and thereby cause said rolls to act upon the pipe or tubing passing between the same. 75

As it is desirable to permit the rolls to be removed and replaced for treating pipes of different diameter, and to replace worn or injured rolls, I provide means for detachably 80 connecting the rolls with their shafts, which may be arranged as shown in Fig. 5. For this purpose the upper end of the shaft is shown reduced in diameter providing a shoulder *a*, and the roll fits upon said reduced end of the shaft and against said 85 shoulder, suitable means, such as a key 38, being provided between the shaft and roll for rotating the latter by the former, and a nut 39 screwed upon the outer end of the shaft holds the roll securely thereon and in 90 true position against the shoulder. By having the rolls detachably connected with the shafts on the portions above and beyond the bearings for the shafts, the rolls may be readily removed and replaced without dis- 95 turbing the shafts in their bearings.

In treating the pipe to loosen and remove the scale from the interior and exterior thereof, and also to maintain as nearly as possible the original diameter of the pipe being treated, by the rolls, I adjust all the rolls to exert uniform pressure upon the pipe, and cause the rolls to exert such light pressure upon the pipe as will be just sufficient to loosen the scale on the walls of the 105 pipe while reducing the diameter of the pipe as little as possible. The light pressure of the first pair of rolls upon the pipe will loosen the scale and as the remaining rolls are adjusted to exert a pressure on the pipe 110 that is uniform with the first pair of rolls no further reduction of the diameter of the pipe will be made by the remaining rolls, and this is also effected by having uniform surface speed of all the rolls so that there will be no 115 tendency to distort the pipe by a non-uniform action thereon of any of the rolls.

By arranging the adjacent pairs of rolls with their axes substantially at right angles to each other the effect is that if the first pair 120 of rolls should produce a flat or indented place or surface in the pipe or tubing passing between them, the next adjacent pair of rolls, running at right angles to the first named pair, will so act upon said pipe as to remove 125 said flat places or surfaces by pressure on such uneven or distorted portion of the pipe and restore the latter to its normal or original condition, and the remaining pairs of rolls will continue to so act on any remaining 130

distorted or raised parts of the pipe. As the rolls through which the pipe passes after being acted upon by the first pair of rolls do not exert any greater pressure on the pipe
 5 than the first pair of rolls, there is no tendency of the remaining rolls to produce flat places in the pipe but they merely act to remove flat places in the pipe made by the first pair of rolls, and assist in feeding the pipe
 10 without altering its diameter, and further serve to maintain the straightness of the pipe and prevent the same from bending or twisting in its passage through the machine. Furthermore, the arrangement of having the
 15 different pairs of rolls adjacent to each other with their axes at an angle to each other is such that the effect of any one pair of said rolls in squeezing the pipe for removing the scale must necessarily be limited or controlled by the action of the pair or pairs of
 20 rolls adjacent thereto, with the result of adding one force to another and thereby forming a resultant force which has a different effect from either force acting independently.
 25 For example, while the compression of the pipe at a particular place produced by one pair of rolls must extend along the wall of the pipe beyond such rolls as far as the adjacent rolls, the compressing force exerted by such
 30 pair of rolls would necessarily be met substantially one-half way between said rolls and the adjacent rolls by the compressing force exerted by the last mentioned rolls. The walls of the pipe are thus manipulated
 35 to a degree not before known whereby the scale from the pipe is more effectively removed. I am aware that pipes have been passed between rolls to loosen the scale, but such rolls as known to me have not been
 40 located with the axes of one pair of rolls at an angle to the axes of another pair of rolls and the force exerted upon the pipe by one such pair of rolls in line with the force exert-

ed upon the pipe by the other pair of rolls, and hence the same character of operation
 45 is not produced as in accordance with my invention. I am also aware that rolls have been provided with passes between them of unequal diameter and which revolve at different speeds, and also that rolls have been
 50 provided at an angle to each other for polishing round bars. Such arrangement of angularly disposed rolls, have not, so far as I am aware, been provided for loosening the scale
 55 upon and within pipe whereby the first pair of rolls will loosen the scale of the pipe, and the second pair of rolls will remove flat places formed in the pipe by the first pair of rolls and restore and preserve the cylindrical form of the pipe without reducing the
 60 diameter of the same.

The particular arrangement of gearing and other details of construction shown and described may be varied within the scope of the appended claim without departing from the
 65 spirit of my invention.

Having now described my invention what I claim is:

The method of removing scale from the wall of metal pipe, consisting in applying sufficient pressure to the exterior wall thereof
 70 to remove the scale without materially reducing the diameter of said pipe, said pressure being applied in lines of direction at right angles to each other and at points in
 75 close proximity and caused to travel longitudinally with respect to the pipe, whereby the shape of the pipe is preserved.

Signed at Chelsea, in the county of Suffolk, and State of Massachusetts, this eleventh day of November, A. D. 1907.

CHARLES THIBODEAU.

Witnesses:

CHAS. F. PERKINS,
 EVERETT N. CURTIS.