C. O. GUSTAVSEN.

MACHINE FOR MAKING HELICOID OR SPIRAL CONVEYERS.

APPLICATION FILED APR. 23, 1906.

908,860.

Patented Jan. 5, 1909.

Fig. 3

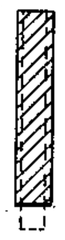


Fig. 4

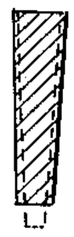


Fig. 5

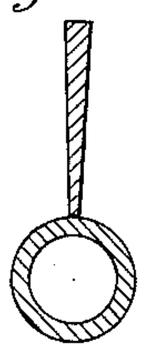


Fig. 6.

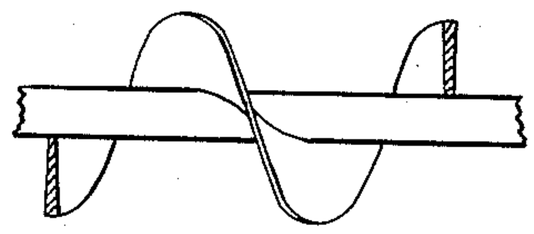


Fig. 1

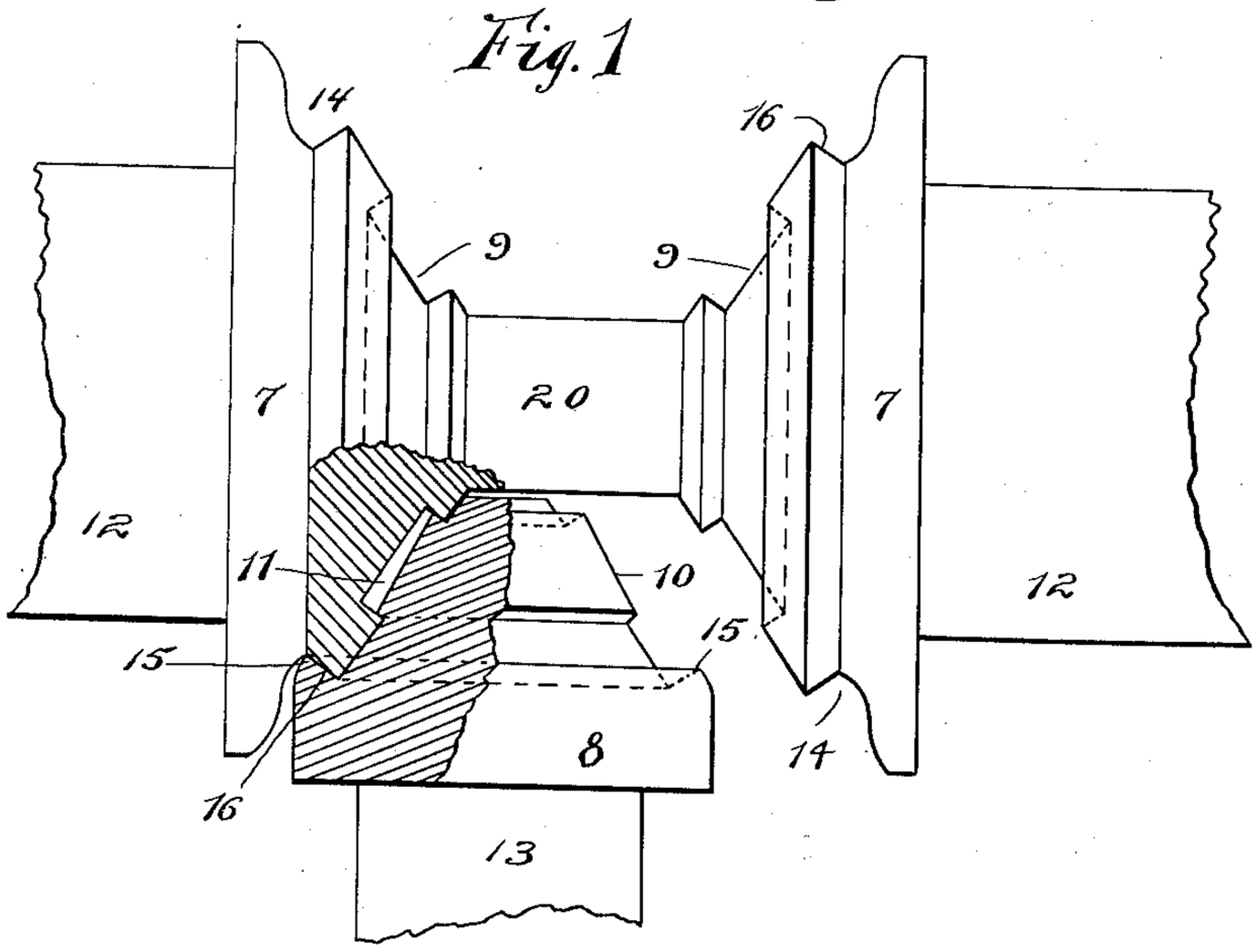
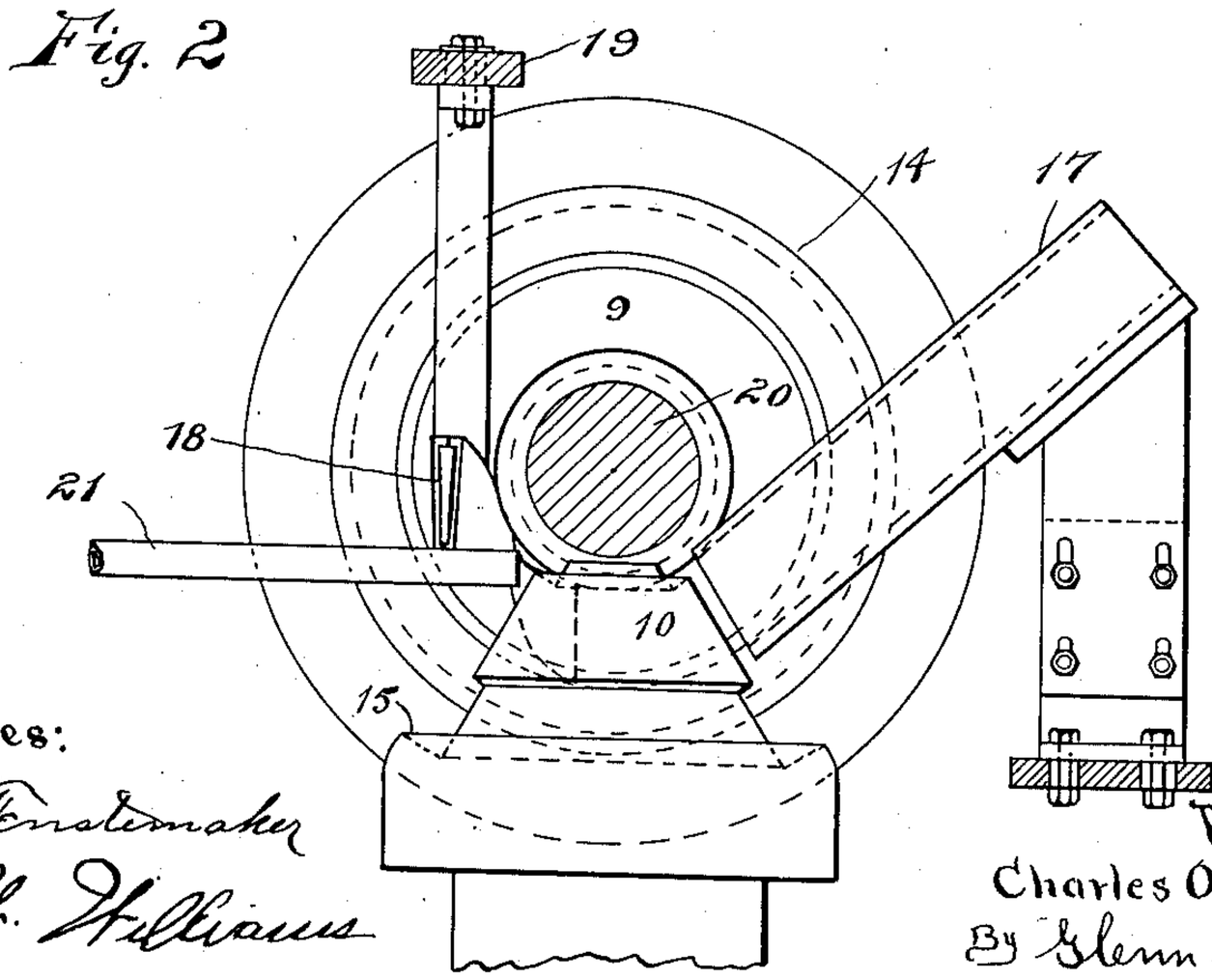


Fig. 2



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UNITED STATES PATENT OFFICE.

CHARLES O. GUSTAVSEN, OF COLUMBUS, OHIO, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE JEFFREY MANUFACTURING COMPANY, A CORPORATION OF OHIO.

MACHINE FOR MAKING HELICOID OR SPIRAL CONVEYERS.

No. 908,860. Specification of Letters Patent. Patented Jan. 5, 1909.

Original application filed March 13, 1905, Serial No. 249,803. Divided and this application filed April 23, 1906. Serial No. 313,349.

To all whom it may concern:

Be it known that I, CHARLES O. GUSTAVSEN, a citizen of the United States, residing at Columbus, county of Franklin, and State of Ohio, have invented certain new and useful Improvements in Machines for Making Helicoid or Spiral Conveyers, of which the following is a specification.

This invention relates more particularly to machines which are adapted to roll or form a continuous helicoid or conveyer from a strip of suitable material, and its objects are to provide a machine of this character which will roll certain forms of helicoid as will be explained hereinafter.

In the accompanying drawings illustrating this invention, Figure 1 represents a side view, partly broken away, of the rolls used in my improved machine; Fig. 2 is a sectional or end view showing a pair of rolls, with guides for feeding the material and for taking it away; Fig. 3 is a view showing a section of the material from which the helicoid is to be rolled, the dotted lines representing the cross-section of the material after it has been formed into a spiral or helicoid of uniform thickness; Fig. 4 represents a cross-section of material of another form which may also be used, the dotted lines showing the shape of the cross-section of the resulting spiral; Fig. 5 shows a cross-section of a spiral or helicoid with its outer edge of greater thickness than its inner edge, the latter being nearest to the pipe or shaft upon which the spiral is secured; and Fig. 6 represents a portion of completed spiral with its outer edge thicker than its inner edge.

Heretofore it has been considered possible only to roll spirals or helicoids from continuous strips in such a manner that the outer edge of the spiral would be of less thickness than the corresponding edge of the strip from which it was formed. For instance, if the strip from which the spiral was made was of uniform thickness, then the resulting spiral would be tapering in cross-section with its outer edge considerably thinner than its inner edge; or if the strip were thicker at one edge than at the other and the thick edge were used to form the outer part of the spiral, then the resulting spiral would be of uniform thickness. By means of my improved machine, spirals or helicoids can be rolled from a continuous strip of suitable metal in such a way that the resulting spiral formed from a strip of uniform thickness may thus be of uniform thickness or may be thicker at its outer edge than at its inner edge. And in a similar way, using a strip of stock having one edge thicker than the other, a spiral may be formed, having its outer edge tnicker than its inner edge, in a manner corresponding to the stock from which it was rolled.

As shown in the accompanying drawings, Figure 1 illustrates a pair of rolls of the form which I prefer to use, 7 representing a large roll, and 8, a smaller roll which coacts with the large roll to form the spiral. These rolls may be supported in any suitable manner and may, for instance, be arranged and driven substantially as shown in my previous patent No. 760,448 of May 24, 1904, or may be arranged and driven in any desired manner. The roll 7 is provided with a peripheral groove 9 into which extends a peripheral or annular ring or portion 10 of the roll 8. The ring 10 does not extend to the full depth of the groove 9, but leaves a passage or box-pass 11 between its outer surface and the bottom of the groove 9. This pass may be either rectangular in outline, as when a helicoid of uniform thickness is to be produced, or it may be wider at its outer edge than at its inner edge, as shown in the drawings, so that the resulting spiral will be thicker at its outer edge than at its inner edge. These conical rolls may be considered as having a common pitch line which passes from the intersection of the axial lines of said cones substantially through the center of the pass 11, and the corresponding imaginary cones contacting along this line could be considered as the pitch cones of the two rolls. These rolls also embody a novel feature whereby they are interlocked to prevent too great a strain on the bearings 12 and 13, and also to prevent the opening or distortion of the pass when the stock is being rolled therethrough. This interlocking means comprises a second groove 14 which is cut in the roll 7, and an annular engaging flange or member 15 on the roll 8, which interlocks with the shoulder 16 formed by the groove 14. It will readily be seen that this interlocking shoulder and flange will prevent the rolls 7 and 8 from being pressed apart or sprung when the helicoid is being formed. This engaging shoulder and flange also perform the further func-

tion of holding the cones in proper alinement, so that the lower cone 8 will not creep or shift up toward the other cone and thereby become jammed or have its ring 10 or small end become burred or injured by engaging with the cone 7 or its connecting shaft 20. The rolling contact between these members, which are driven so that they have the same peripheral speed, is preferable for the purpose mentioned, to ordinary boxes and collars which would become worn more rapidly and cause more friction.

A further novel feature of this invention consists in setting the feed guide 17 at such an angle to a plane passing through the axes of the rolls, that the material will be so presented to the rolls as to allow the latter to crowd or squeeze the material across the width of the stock bar so that the helicoid produced may remain of uniform thickness or may even be thicker at its outer, than at its inner edge. This angle, as shown in the drawings, may be considered as being an angle of less than 90° from the pitch line of the cones, when measured from the intersection of the axial lines of the cones; or an acute angle to a plane perpendicular to the pitch line or line of tangency of the pitch cones.

As shown in Fig. 2, the straight feed guide 17 is considerably higher at its outer end than at the inner end so that the material or stock fed into the machine will first engage at its upper-forward corner which is nearest to the center, and thus the material travels, as it were, at an angle through the pass. The guide 17 may be supported from the frame in any desired manner, and may be made adjustable in order to readily secure the proper angle.

The discharge or forming guide 18 is made in the form of the helicoid to be produced and strips the metal directly from the rolls, thus preventing it from wrapping itself around either of the rolls as might otherwise occur. This guide may also be supported in any desired manner as from a cross-bar 19 secured in the frame (not shown) of the machine.

It will be obvious that a plurality of rolls may be arranged with coacting cones, as shown in my previous patent, so that right or left hand spirals, or a plurality of spirals of different sizes may be made in same machine. It will be observed that the cone 8 could be placed above the cone 7 or at any angle thereto for convenience in arranging the feed and forming guides to prevent scale from falling upon the bearings of the cone 8.

In operation, the material is heated in a suitable furnace to a proper degree of temperature and is then fed through the feed guide directly to the rolls. These crowd the material from the inner edge toward the outer, and simultaneously elongate the outer edge sufficiently to form the desired spiral. The spiral or helicoid thus formed is trued up or completed by passing through the forming guide, which gives it the shape desired. A mandrel or pipe 21 is placed adjacent to the rolls and the forming guide to receive the helicoid as it comes from the machine.

The angle between the center lines of the cones may be made 90 degrees as shown, or at a different angle, if desired to change the pitch of the helicoid.

This application is a division of my former application No. 249,803, filed March 13, 1905; and I do not claim herein the method or product, but

What I claim and desire to secure by Letters Patent is:

1. In an apparatus for rolling helicoids or the like, the combination with a pair of conical rolls, of a feed guide arranged at an acute angle to a plane perpendicular to the pitch line of said cones.

2. In an apparatus of the character set forth, the combination with a pair of coacting conical rolls, of a feed guide arranged at an angle of less than 90° to a line of tangency or pitch line between said cones, said angle being measured in the direction of the point of intersection of the axial lines of said cones.

3. The combination of a relatively large forming roll having grooves cut therein, a smaller roll with its axis arranged at substantially 90° to the axis of said first-named roll, said smaller roll being provided with a ring entering part way into the groove of the first roll to form a box pass, and an adjustable feed guide arranged at an angle of less than 90° toward the smaller ends of said rolls to a pitch line or line common to said rolls.

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