No. 760,448. PATENTED MAY 24, 1904.

C. O. GUSTAVSEN.

MACHINE FOR ROLLING HELICOIDS OR SPIRAL CONVEYERS.

APPLICATION FILED JULY 24, 1903.

NO MODEL.

Fig 3.

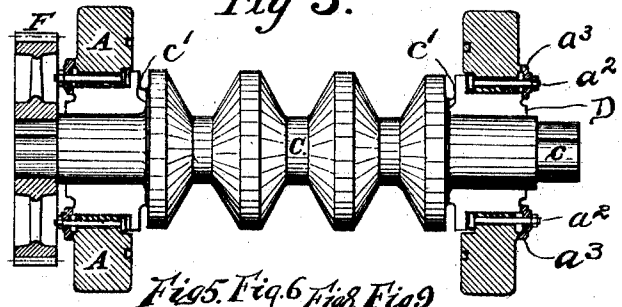


Fig 5. Fig 6 Fig 8. Fig 9

Fig 7

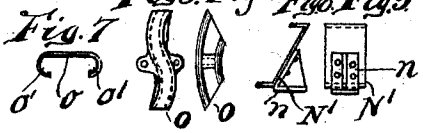
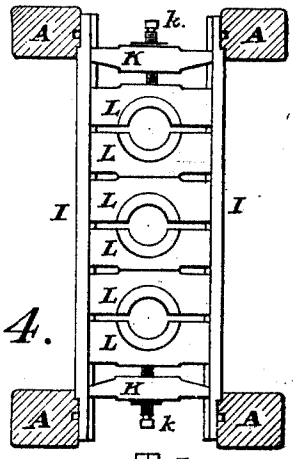


Fig 4.



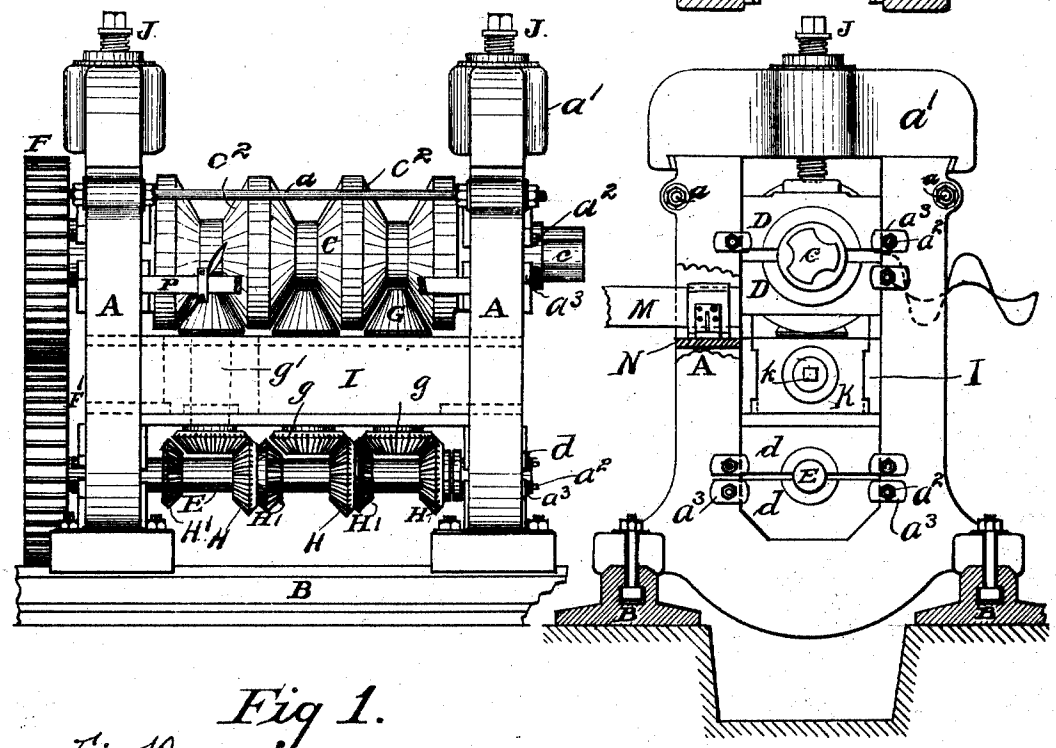


Fig 1.

Fig 2.

Fig 10

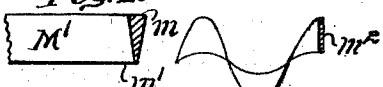


Fig 11

Fig 12

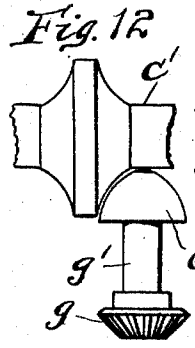
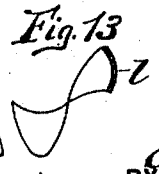


Fig 13



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No. 760,448. Patented May 24, 1904.

UNITED STATES PATENT OFFICE.

CHARLES O. GUSTAVSEN, OF CHICAGO, ILLINOIS.

MACHINE FOR ROLLING HELICOIDS OR SPIRAL CONVEYERS.

SPECIFICATION forming part of Letters Patent No. 760,448, dated May 24, 1904.

Application filed July 24, 1903. Serial No. 166,843. (No model.)

To all whom it may concern:

Be it known that I, CHARLES O. GUSTAVSEN, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Machines for Rolling Helicoids or Spiral Conveyers, of which the following is a specification.

This machine relates more particularly to means for forming regular helicoids having substantially straight faces or helicoids having the flights provided with dished or curved surfaces; and its objects are to provide a machine of this character which will be simple in construction and durable in operation and which may be readily adjusted to form a plurality of spirals concurrently of either right or left hand formation or both right and left hand.

It consists in the combination, with a suitable framework, such as ordinarily used for rolling-mills, of various operative parts and driving mechanism necessary for forming a helicoid from a continuous strip of suitably-shaped material.

Other features and details will be pointed out more specifically hereinafter.

In the drawings, Figure 1 represents an elevation of a machine embodying this invention viewed from the rear or discharge side. Fig. 2 represents an end elevation of the same. Fig. 3 is a sectional detail showing the method of adjusting the forming-roll. Fig. 4 is a sectional plan detail showing adjusting mechanism for the cones. Fig. 5 is a rear view of the guide for the helicoid as it is being formed. Figs. 6 and 7 are side and end views, respectively, of the same. Figs. 8 and 9 are front and side views, respectively, of the guide for the material as it is fed into the machine. Fig. 10 is a detail showing a portion of the stock to be formed into the helicoid. Fig. 11 is a detail showing a section of the completed helicoid. Fig. 12 is a detail showing a formation of the roller and cone for forming dished or curved-faced helicoids. Fig. 13 is a detail showing a portion of the dished helicoid.

Upright frame members A A are secured to a suitable base or bed plate B. These upright members form the ends of the frame for the machine and are connected together at the top by tie-rods a and are provided with cap-pieces a'. The end frames A are provided with boxes D for the horizontal roll C. For reasons which will appear hereinafter this roll is adapted to be adjusted longitudinally of the frame, and for this purpose the bearings D are allowed a slight play between the shoulders c' on the roll and the inner sides of the frame A. Bolts a^2, having countersunk heads, are provided with clips a^3, which bear against the outer sides of the frames A and the outer ends of the bearings D. It will be readily seen that when it is desired to move the roll C in one direction the bolts are loosened at the end toward which the roll is to be moved. Then by tightening the nuts of the bolts at the opposite end the clips a^3 will press the bearings d toward the opposite side, and thereby move the roll C. It will be observed that this adjustment is simply for a very limited movement. The roll C is provided at one end with a gear F, which meshes with a gear F′ on a shaft E, which is located below the roll C. The shaft E is also carried in bearings d in the end frames A, and these bearings d are provided with a similar adjustment to that just described for moving the shaft longitudinally of the frame. On the shaft E are secured bevel-gears H and H′, which are adapted to engage at times with corresponding bevel-gears g on the ends of vertical shafts g', which carry at their upper ends conical rolls G. The shafts g are secured in bearings L, which are carried by cross-plates I, connecting between the end frames A. The bearings L are slidably secured to the plates I and may be adjusted by means of screws k k, which engage with rigid cross-pieces K and bear against the end bearings L. The bearings D and d and the plates I are all removably secured in the end frames A and are rigidly secured by means of the set-screws J.

At the front of the machine is a cross-bar N, which carries the guides N′ for the material as it is fed into the machine. The guides N′ are simply angular-shaped pieces which are held by brackets n and direct the material

into the proper rolls. At the opposite or rear side of the machine is a cross-bar P, which carries the forming-guides O. These guides are shaped similar to a portion of the helicoid to be formed and are formed of a flat plate *o*, which is turned over at the edges to form grooves *o'* for the material.

The machine may be driven in any convenient manner by connecting the shouldered end *c* of the roll C with any suitable source of power.

The stock, which consists of a long strip M of suitable material, is directed into the aperture between the conical face c^2 of the roll C and the cone G by the guide N'. As it passes between said conical surfaces it is formed thereby into the desired spiral and is directed through the guide O in order to give it the properly-finished shape.

By means of having the cones G between two conical surfaces of the roll C it is obvious that the helicoids may be formed on either side of the cone. It is for this reason that the roll C is made longitudinally adjustable in the frame, and for the same reason the shaft E is also longitudinally adjustable, which allows its being shifted to throw the gears H out of engagement with the gears *g* and allows the gears H' to be thrown into engagement therewith. By thus changing the gears the cones are turned in the proper direction to correspond with the motion of the conical surfaces of the roll. By means of this adjustment right and left hand helicoids may be formed with the same cone, and by means of the plurality of cones a number of helicoids may be formed at the same time. The relative speed of the roll and the cones may be changed by changing the gears F F' or the bevel-gears H *g*. Any desired pitch may be given to the cone and the corresponding conical surfaces of the roll to form the different-shaped helicoids.

An important feature of this invention lies in the fact that the roll which comprises one of the sides of cones may be rigidly held by having the two bearings, and the lower cones are also rigidly held in their bearings in the framework and are preferably not moved except to adjust them for wear.

In forming a helicoid from a straight piece of metal it is obvious that the portion forming the outer part must be stretched or worked out in order to provide the material necessary for this elongated part of the flights. I prefer to form the helicoids from a special shape of bar M', such as shown in Fig. 10, which has one edge *m* somewhat thicker than the other. When a strip of this shape has passed through the machine, the rolls flatten and draw out this thickened edge to form the outer part of the helicoid, so that it will have a substantially even thickness when completed, as shown at m^2 in Fig. 11. However, I do not wish to be limited to this method of forming the spiral, as it is apparent that a strip of even thickness may be used, in which case the resulting helicoids will be thinner at the outer edge and taper toward the inner edge.

It is frequently desirable to use a helicoid having flights of dished or curved cross-section. In order to form a flight of this nature, I use a roll C with a correspondingly-curved face, as shown in Fig. 12, which coacts with an oppositely-curved cone G'. By using this form of rolls a helicoid will be formed with a section such as shown at *l* in Fig. 13. It will be noted that the curvature is somewhat exaggerated in these views, as the amount necessary would be very slight, and, in fact, it is frequently desirable to give a slight amount of curvature to the so-called "straight-faced" cones in order to facilitate the forming of the spirals. However, this amount of curvature is so slight as to be inappreciable in the drawings of the scale shown.

It is obvious that various changes in the details of construction may be made without departing from the spirit of my invention, which I consider to be broadly new in various features and do not wish to limit to the exact construction herein shown and described; but

What I claim, and desire to secure by Letters Patent, is—

1. In a machine for forming helicoids, the combination with a forming-roll having substantially conical surfaces, of a cone adapted to coact at times with each of a pair of said surfaces to engage the stock and form a helicoid and means for causing said cone to coact with said conical surfaces.

2. In a machine for making helicoids or spiral conveyers, the combination of a framework, a forming-roll secured in said framework, a plurality of cones having their bearings in said framework and adapted to coact with said forming-roll, and means for turning said roll and cones.

3. In a machine of the nature set forth, the combination with the spiral-forming mechanism, of a guide adapted to engage the spiral after passing through the forming mechanism, said guide being formed with substantially the same outlines as the spiral to be formed.

4. In a machine of the nature set forth, the combination of a frame, a forming-roll adjustably secured in said frame and having conical surfaces formed thereon, vertically-arranged cones adapted to engage with said conical surfaces at the lower side of said roll, shafts on which said cones are mounted, gears on said shafts, a shaft adjustably secured in said frame, gears on said shaft adapted to engage with said first-named gears, spur-gears whereby said shaft may be driven from said roll, and means for adjusting said roll whereby oppositely-disposed conical faces may be brought to coact with said cones, and means for ad-

justing said shaft whereby oppositely-disposed gears may be brought into engagement with the gears on the cone-shafts, substantially as described.

5. Means for forming a helicoid, having flights of curved cross-section, said means comprising cone-shaped forming-rolls having curved faces and cone-shaped rolls adapted to coact therewith, having faces oppositely curved to the faces of the first-named conical members, substantially as described.

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