Jan. 23, 1951 E. A. SCHRYBER 2,538,950

CHUCK FOR MANUFACTURE OF FINNED TUBING

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FIG. 1.

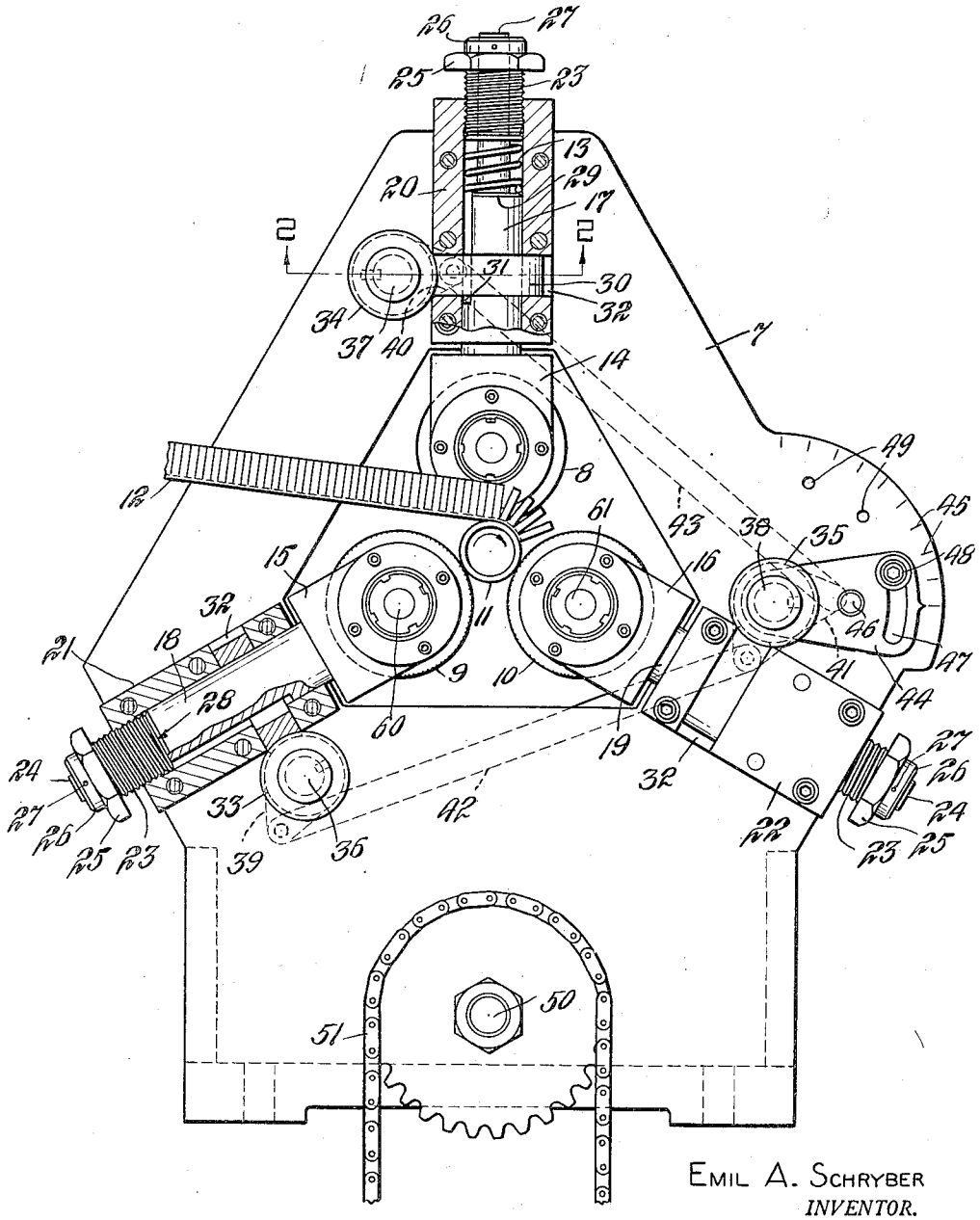

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FIG. 2.

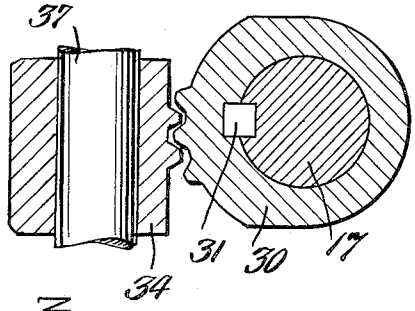

FIG. 3.

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FIG. 4.

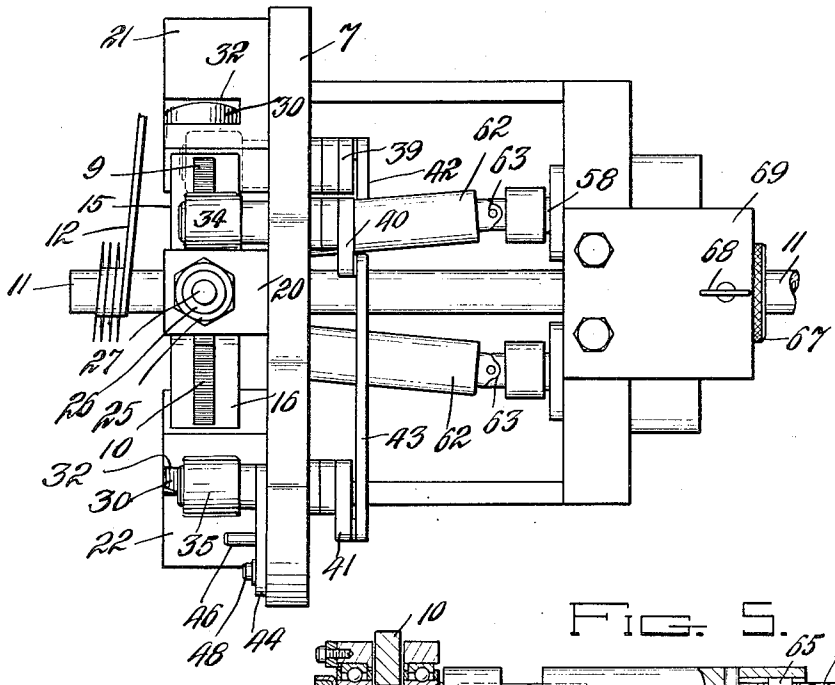


FIG. 5.

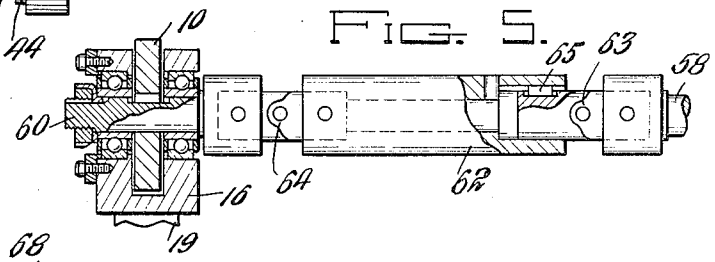
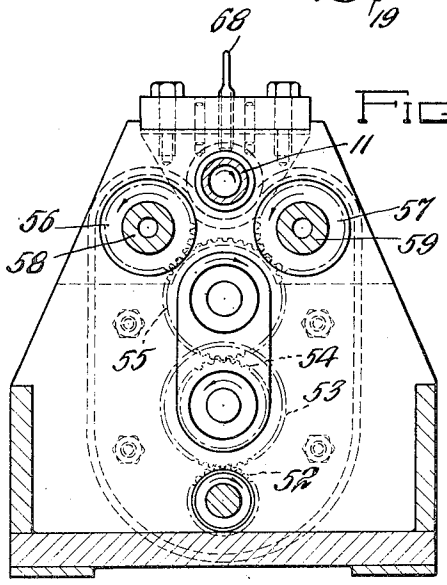


FIG. 6.



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2,538,950

CHUCK FOR MANUFACTURE OF FINNED TUBING

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4 Claims. (Cl. 214—1)

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The invention here disclosed relates to the manufacture of finned tubing and is particularly concerned with mechanism for rotating and longitudinally advancing the tubing or core element to which the finning strip is applied.

Special objects of the invention are to provide a chuck construction for helically advancing the tubular or other core stock, which will be accurate and dependable in its operation of rotating and advancing the stock and which will be capable of quick adjustment to effect operation at the desired pitch angle.

Other special objects of the invention are to provide mechanism of the character indicated which will be of simple, rugged design and construction and generally practical and efficient for the purposes intended.

Other desirable objects and the novel features of construction through which all purposes of the invention are attained, are set forth or will appear in the course of the following specification.

The drawings accompanying and forming part of the specification illustrate a present commercial embodiment of the invention. Structure, however, may be modified and changed as regards the immediate illustration, all within the true intent and broad scope of the invention as hereinafter defined and claimed.

Fig. 1 in the drawings is a front or end elevation of the chuck structure as in operation winding a strip of slitted fin material onto a tubular core, with portions shown broken away and in section. In this and succeeding views the rolls for winding on the strip, for simplicity are shown disposed at right angles to the core but in actual operation, as later described, they are inclined to the axis of the stock.

Fig. 2 is an enlarged cross sectional detail of one of the worm gear units for adjusting the pitch angle of the helically disposed supporting and driving rolls, this view appearing as taken on substantially the plane of line 2—2 of Fig. 1;

Fig. 3 is a broken side elevation of the machine with parts appearing in section;

Fig. 4 is a broken top plan view of the machine;

Fig. 5 is a broken part sectional view of one of the universally jointed, longitudinally extensible roll driving shafts;

Fig. 6 is a vertical cross sectional view of the parts as appearing on substantially the plane of line 6—6 of Fig. 3.

The frame of the machine, designated 7, forms a head and supporting structure for three rolls 8, 9 and 10, grouped in equally spaced triangular relation about the tubular core or center member

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11, on which the finning strip 12 is being helically wound.

The top roll 8, as shown in Fig. 1, is a pressure roll backed up by a spring 13 and holding the tubular stock in rolling engagement with the two lower rolls 9 and 10. The latter are positively driven.

All three rolls are faced to engage the stock at an angle substantially in accord with the pitch angle of the strip being helically wound on the core stock.

This is accomplished by mounting the rolls in the forks of yokes 14, 15, 16, having spindles 17, 18, 19, rotatable in bearings 20, 21, 22, on the face of the supporting head or frame 7.

The spindles of the roll carrying yokes are longitudinally adjustable in their bearings to fit the rolls to core stock of different diameters and rotatably adjustable to set the rolls to the desired pitch angle.

In-and-out adjustment of the rolls is effected, in the illustration, by means of screw sleeves 23 threaded into screw seats in the outer ends of the bearings 20, 21, 22, about the reduced outer end portions 24 of the yoke spindles, these sleeves having angular heads 25 by which they may be turned, bearing against abutment collars or washers 26 pinned on the outer ends of the spindles at 27.

The drive rolls 9 and 10 are positively set against the tubing and this is accomplished by having the inner ends of the screw sleeves 23 engage shoulders 28 on the roll carrying spindles at the inner ends of the reduced portions 24.

The upper roll 8 is yieldingly thrust toward the faced driving rolls by the spring 13, which is shown disposed about the reduced portion 27 of that spindle between the inner end of the screw sleeve 23 and shoulder 29 on the yoke spindle 17.

It will be seen that inward adjustment of the screw sleeves 23 in the bearings 21, 22, will set the two lower driving rolls 9 and 10 closer to the common center and that the outward adjustment of these screw sleeves will be effective, against the abutment collars 26, to draw these rolls outward, for larger diameter stock.

Inward adjustment of the screw sleeve 23 for the upper, pressure roll 8 will compress the spring 13 to cause this roll to press the revolving stock more firmly against the drive rolls and to adjust it for smaller diameter stock.

Conversely, outward adjustment of this screw sleeve will be effective, against the abutment collar 26, to retract the pressure roll and to open it up for cooperation with larger diameter stock.

The angular or pitch adjustment of the rolls is accomplished in the illustration through the provision of worm gear elements 30 slidingly keyed at 31 on the yoke spindles 17, 18, 19, and confined in cross slots 32 in the yoke bearings 20, 21, 22, these gears being engaged by the worms 33 34, 35, keyed on the ends of stub shafts 36, 37, 38, at the front of the head or frame 7 these shafts carrying at the back of this plate rock arms 39, 40, 41, connected to be operated in unison by links 42 and 43.

In the illustration an adjusting lever 44, Fig. 1, is faced on shaft 38 registering with an adjustment scale 45 on the front of the frame plate. This lever is shown equipped with a handle 46 for actuating the same, slotted at 47 for passage of a securing and movement limiting bolt 48. The frame or face plate 7 is shown as having screw openings 49 to receive this bolt for limiting the adjusting lever to different ranges of movement over the scale 45. The links 42 and 43 are shown extending, respectively, from the rock arm 41 to the rock arms 39 and 40 of the shafts 36 and 37 for effecting adjustment of drive roll 9 and pressure roll 8.

When the holding screw 48 is released, hand lever 44 can be used to rock shaft 38 to adjust the angle of drive roll 10, and this shaft through the lever and link connections with the other two shafts 36 and 37, will effect corresponding angular, pitch adjustments of the other two rolls 9 and 8. Consequently, adjustment of the one driving roll will accomplish corresponding adjustments of the two other rolls. The worm gears will hold the rolls fixed in their positions of adjustment and these settings are maintained by the securing of the adjusting lever 44 in the position to which it has been set. If greater range of adjustment is necessary, the securing bolt 48 may be withdrawn and the lever 44 set in an extended position where the bolt may be entered in another one of the screw seats 49 provided in the scale plate.

The mechanism for operating the drive rolls is shown as comprising a main drive shaft 50 operated by chain and sprocket 51, this shaft carrying a pinion 52, Fig. 3, meshing a gear 53 carrying a pinion 54 in mesh with a gear 55 which, as shown in Fig. 6, meshes with gears 56, 57, at opposite sides of the same, these being fixed on shafts 58, 59, and coupled by extensible, universally jointed shafting with the shafts 60, 61, carrying the drive rolls 9 and 10.

Fig. 5 shows in detail one of the extensible, universal jointed shaft units, comprising an intermediate length of tubular shafting 62 connected at opposite ends with the final drive shaft (58) and with the roll shaft (60) by universal joints 63, 64, said sleeve having a splined or sliding key connection 65 at one end to allow for necessary extension and contraction of the overall shaft length in the various adjustments of the drive roll.

The extensible and universal drive connections disclosed enable operation of the two lower drive rolls regardless of the in-and-out and angular adjustments of these rolls.

The drive gearing, as shown in Fig. 3, may be enclosed within a gear case 66.

This view also shows how a guide bushing 67 of proper size for the tubing 11 may be secured by clamp screws 68 in a seat or bearing 69 provided for it in the frame structure.

The rolls for supporting and driving the tubular or other core stock may be plain or specially

surfaced to best perform their particular purposes. The drive rolls 9 and 10 may be knurled, toothed or roughened to grip the work and the pressure roll may be smooth, substantially as indicated.

The rolls being set to properly grip the work and inclined to the proper helix pitch angle, it will be evident that they will roll and longitudinally advance the tubing at a rate in correspondence with the rate of advance of the fin strip being helically wound on the tubing, and it will further be evident that by simple adjustments of the hand lever 44 all three rolls may be simultaneously adjusted to the same extent, to different helix pitch angles.

The structure is particularly simple and the rolls are exposed so that the action can be observed and corrections or adjustments quickly made as conditions may require.

What is claimed is:

1. A chuck for helically feeding tubing for application of a finning strip thereto and comprising a guide for centering and axially directing a length of tubing, substantially radially disposed bearings about the axis of the guided tubing, yokes having spindles longitudinally and rotatably adjustable in said bearings, rolls journaled in said yokes for engagement with the guided tubing, means for driving certain of said rolls regardless of longitudinal and rotary adjustment of the yoke spindles and means for effecting simultaneous rotary adjustment of the spindles in said bearings including worm gears slidably keyed on the spindles, worms in engagement with the respective worm gears, linkage between said worms and leverage means for effecting angular adjustment of said linkage.

2. A chuck for helically feeding tubing for application of a finning strip thereto and comprising a guide for centering and axially directing a length of tubing, substantially radially disposed bearings about the axis of the guided tubing, yokes having spindles longitudinally and rotatably adjustable in said bearings, rolls journaled in said yokes for engagement with the guided tubing, means for driving certain of said rolls regardless of longitudinal and rotary adjustment of the yoke spindles and means for effecting simultaneous rotary adjustment of the spindles in said bearings including worm gears slidably keyed on said spindles, said bearings having transverse seats receiving said worm gears and rotatably confining the same against longitudinal movement in respect to the spindles, worm elements engaged with the respective worm gears and linkage tying said worm elements together for insuring simultaneous angular adjustment of all the same.

3. A chuck for helically feeding tubing for application of a finning strip thereto and comprising a guide for centering and axially directing a length of tubing, substantially radially disposed bearings about the axis of the guided tubing, yokes having spindles longitudinally and rotatably adjustable in said bearings, rolls journaled in said yokes for engagement with the guided tubing, means for driving certain of said rolls regardless of longitudinal and rotary adjustment of the yoke spindles and means for effecting simultaneous rotary adjustment of the spindles in said bearings, spring means forcing one of the roll carrying spindles toward the tubing axis, means for positively setting other roll carrying spindles toward the tubing axis and means interconnecting said spindles for rotatively adjusting

the same in their bearings independently of the described longitudinal adjustment of the spindles in respect to the tubing axis and thereby enabling the simultaneous setting of said rolls at a desired feeding angle to the tubing irrespective of the diameter of the tubing.

4. A chuck for rotating and longitudinally advancing tubing to which finning strip is being helically applied and comprising three tubing engaging rolls grouped in triangular relation about the axis of the tubing, yokes in which said rolls are journaled, said yokes having spindles, bearings in which said spindles are longitudinally and angularly adjustable, worm gears slidingly keyed on said spindles and held in said bearings against longitudinal movement, worm elements in engagement with said worm gears, links connecting said worm elements, means for imparting angular adjustments to one of said worm elements and whereby through said linkage corresponding adjustments will be imparted to the other worm elements, said spindles having reduced outer ends, screw sleeve abutments about said reduced outer ends of the spindles and

screwed in the outer ends of the bearings, certain of said abutment screw sleeves positively engaging the spindles for positively shifting the same inward toward the tubing axis, a spring interposed between the inner end of one of the other abutment screw sleeves and the spindle in that bearing for yieldingly thrusting the latter toward the tubing axis and universal drive connections to said first mentioned, positively adjusted rolls.

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