

[54] WIRE FEEDER

[72] Inventor: **Kenneth G. Carter**, 175 Virginia St., Salt Lake City, Utah 84107

[22] Filed: **March 12, 1970**

[21] Appl. No.: **18,891**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 755,336, Aug. 26, 1968, abandoned.

[52] U.S. Cl. 226/108, 226/187, 226/184

[51] Int. Cl. B65h 17/20

[58] Field of Search. 226/184, 187, 188, 108, 181, 226/174; 219/130, 136

[56] References Cited

UNITED STATES PATENTS

3,331,545 7/1967 Olivieri 226/187

3,447,730 6/1969 Jeannette 226/187 X
1,867,343 7/1932 Wittek 226/187 X
2,548,136 4/1951 Auer 226/187 X

Primary Examiner—Allen N. Knowles

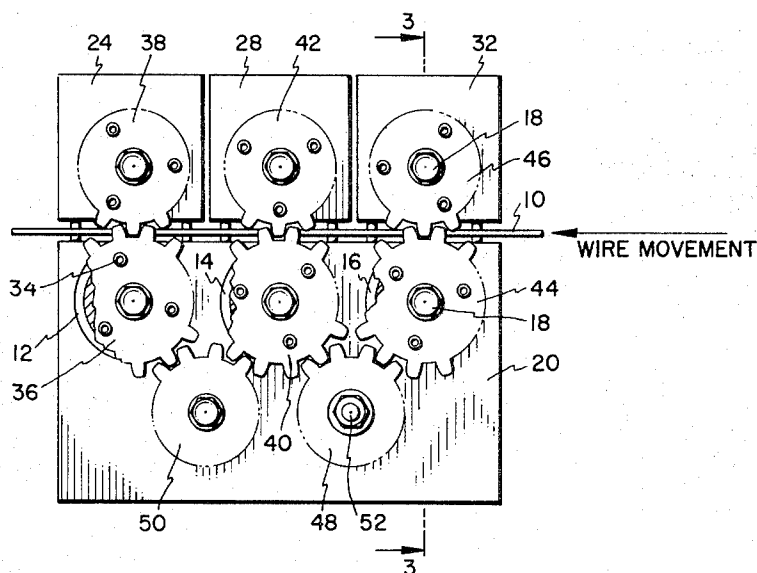
Attorney—C. Harvey Gold, David V. Trask and William S. Britt

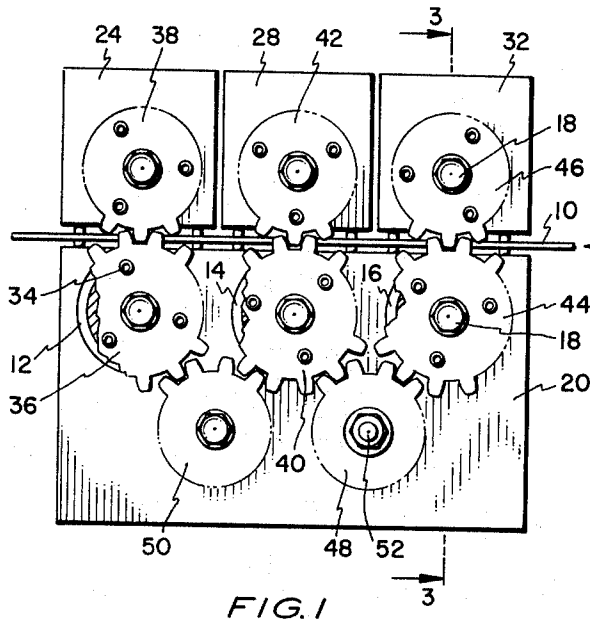
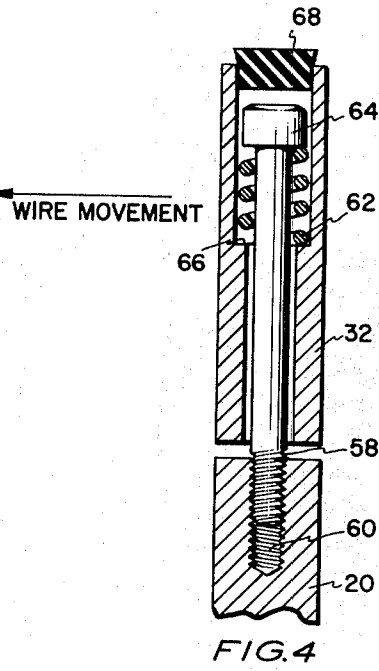
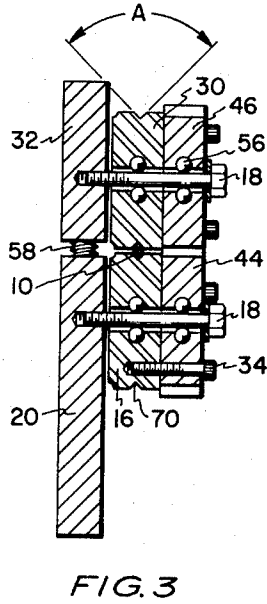
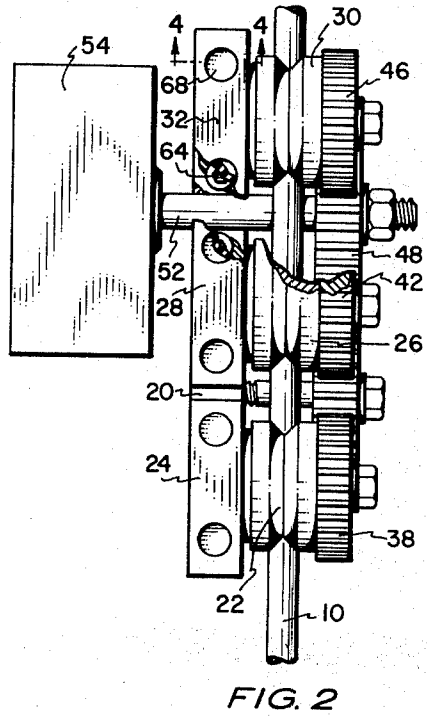
[57]

ABSTRACT

A wire feeder including a frame which supports three pairs of rotatably mounted drive rolls in a position to pass wire in a substantially straight line between the pairs of rolls and means connected to each of the rolls of each of said pairs of rolls for driving each of said rolls at the same speed. The drive rolls are grooved with sidewalls contacting at an angle of 100° to 150° and at least one drive roll in each pair of rolls can be provided with biasing means for urging the roll towards its coating drive roll to impart a driving pressure to the wire between the pair of rolls.

4 Claims, 4 Drawing Figures





INVENTOR.
KENNETH G. CARTER

BY

C. H. H. Gold
HIS ATTORNEY

WIRE FEEDER

RELATED PATENT APPLICATION

This application is a continuation-in-part of my co-pending U.S. application, Ser. No. 755,336, filed Aug. 26, 1968, now abandoned, entitled "Wire Feeder."

BACKGROUND OF THE INVENTION

This invention relates to a wire feeding mechanism particularly suited for feeding tubular welding wire.

The development of tubular welding wire has made practical many types of welding operations not heretofore possible. For example, pressure rolls can be hard faced with rebuilding devices of the type described in my U.S. Pat. No. 3,339,055. Tubular wires are made with a metal tape in a fashion very similar to the method one would use to construct a handmade cigarette. Because of this construction the wire has several properties which make it inherently difficult to drive. For example, even when the wire has been finish drawn to size, heat treated and layer wound, it exhibits a twisting tendency when it is uncoiled. This tendency makes feeding the wire through the necessary tubes, guides, nozzles and pickup tips, required in most welding operations, very difficult. In addition, the tubular wire is very sensitive to various types of deformation which often prevent the wire from being properly fed during the welding operation. Also, the wire's surface is easily marred by conventional driving mechanisms which results in poor current pick up. Accordingly, a great need has arisen for an improved feeding device which minimizes wire deformation while applying substantial driving force to the wire.

SUMMARY OF THE INVENTION

In its broadest form, the invention comprises a wire feeding device comprising support means having a plurality of pairs of grooved drive rolls rotatably mounted to said support to pass tubular welding wire in a substantially straight line between the pairs of rolls, and drive means connected to each of the rolls of each of said pairs of rolls for driving said rolls at the same speed. The rolls are grooved such that the tangent of the point of contact of the wire with one side of the groove intersects the tangent of the point of contact of the wire with the opposite of the groove at an angle of 100° to 150°.

In a preferred embodiment of the invention, three pairs of rolls are rotatably mounted to the frame so that the tubular welding wire passes between said rolls in a substantially straight line and is straightened thereby.

In another embodiment of the invention at least one roll in each pair of grooved rolls is provided with biasing means for urging the roll toward its coacting drive roll to impart a predetermined pressure on the tubular wire between the rolls.

BRIEF DESCRIPTION OF THE DRAWINGS

So that the invention may be more readily understood and carried into effect, reference is made to the accompanying drawings which are offered by way of example only and are not to be taken as limiting the invention, the scope of which is defined by the appended claims and which are intended to embrace equivalent structures.

FIG. 1 is a plan elevation view of the wire feeding apparatus of this invention which is shown partially broken away for purposes of clarity.

FIG. 2 is a top view of the feeding apparatus shown in FIG. 1. A portion of the feeding apparatus is shown broken away.

FIG. 3 is a sectional view taken in the plane of line 3—3 of FIG. 1 looking in the direction of the arrows.

FIG. 4 is a partial sectional view taken in the plane of line 4—4 of FIG. 2 looking in the direction of the arrows.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The wire feeding apparatus of this invention comprises coacting pairs of grooved rolls positioned so that a tubular wire 10 can pass between the rolls and be driven thereby. At

least two pairs of rolls are used to impart the desired driving force to the wire. Most preferably three pairs of rolls are used to also straighten the wire as it is driven through the device. Each roll in the drive mechanism is individually driven and the speed of each individual roll is synchronized so that all of the rolls are driven at the same rate. At least one roll in each pair of rolls is preferably spring loaded to impart a predetermined force on the wire 10 when it is positioned between the coacting rolls.

The preferred drive mechanism of this invention is illustrated in FIGS. 1 and 2. As shown, three grooved drive rolls 12, 14, and 16 are rotatably mounted with bolts 18 to support frame 20. Each of these rolls is positioned in a coacting drive relationship with a second grooved drive roll rotatably mounted to a positioning block secured to support 20, i.e., roll 12 drives with roll 22 mounted on positioning block 24, roll 14 coacts with grooved roll 26 mounted on block 28, and roll 16 is positioned to coact with roll 30 mounted on block 32. To insure a uniform drive speed between each of the pairs of the rolls and between individual rolls in each pair, the rolls are preferably formed with a substantially uniform diameter. The pair of rolls are of course mounted so that wire 10 passing therebetween passes in a substantially straight line.

Each of the drive rolls of this invention is formed with a groove 70 which extends about the entire driving surface of the roll to coact with wire 10. Groove 70 is shaped to provide two points of contact with wire 10. Preferably, the groove is formed with two smooth and substantially plane sidewalls which contact each other at an angle, shown as angle A in FIG. 3, of about 100° to 150° and most preferably 110° to 130°. By using a smooth angular groove desirable driving characteristics have been observed. For example, a groove of this type herein described does not urge the seam in tubular wire to open and, in addition, will prevent marring of the surface of the wire which can result in its breakage. When the sides of groove 70 are not substantially plane the groove is shaped so that the tangent of the point of contact of wire 10 with one side of the groove intersects the tangent of the point of contact of the wire with the opposite side of the groove at an angle of 100° to 150° and preferably 110° to 130°.

As indicated, the grooved rolls are individually driven at the same speed. This can be done with drive gears attached to the outside face of the grooved rolls with bolts 34 as illustrated in FIG. 1. Drive gear 36 is attached to roll 12 and drives gear 38 attached to roll 22, drive gear 40 is attached to roll 14 and drives gear 42 attached to roll 26, and drive gear 44 is attached to roll 16 and drives gear 46 attached to roll 30. The movement of each of the drive gears is synchronized with gears 48 and 50 which are rotatably mounted in a conventional fashion to frame 20. Gear 48 coacts with gears 40 and 44 while gear 50 coacts with gears 36 and 42. Accordingly, all of the gears are interconnected and by matching the number of teeth around their periphery they are all driven at the same speed. This movement is imparted to the grooved rolls which, having substantially identical diameters, are also rotated at the same peripheral speed.

All of the gears in the feeding mechanism of this invention are driven with drive shaft 52, which is journaled to frame 20 and connected to gear 48. The shaft can be powered in a conventional fashion with, for example, an electric motor 54. Ball bearings 56 can be positioned in bearing races in the drive gears and grooved rolls to ride on bolts 18 and shaft 52 to insure easy rotation of said gears and rolls.

Positioning blocks 24, 28 and 32 are attached to main mounting frame 20 with bolts 58 which pass through ports in the blocks and are screwed into threads 60 formed in frame 20 as shown in FIG. 4. Springs 62, under compression, are positioned between the heads 64 of bolts 58 and the inwardly extending seats 66 formed in the parts in the positioning blocks. In this fashion, each of the blocks are independently urged towards frame 20 with springs 62. Cap 68 is pressed into the port above the head of the connecting bolts 58 to prevent dirt and other undesirable materials from falling into contact with springs 62 to interfere with their normal operation.

To use the wire feeder of this invention, motor 54 is activated which in turn rotates drive shaft 52 and attached gear 48. The movement of gear 48 drives gears 40 and 44 which in turn drives gears 42 and 46 respectively. In addition, gear 40 drives synchronizing gear 50 which rotates gear 36 and its coacting gear 38. The end of wire 10 is then placed in the grooves between rolls 16 and 30 whereupon it is drawn between the rolls 16 and 30 in grooves 70 and urged towards rolls 36 and 26. When the wire contacts the grooves between rolls 36 and 26 it is urged therebetween and moves on to rolls 12 and 22. As wire 10 moves between each of the pairs of rolls it is contacted by the opposite sidewalls of grooves 70 and is held tightly therebetween with spring 62 so that a driving force is applied to the wire which can be controlled by loosening or tightening connecting bolts 58.

By using a tubular wire feeding device of the type herein described, several advantages are obtained. For example, each pair of drive rolls contacts tubular wire 10 without subjecting the wire to excessive pressure between any single pair of grooved rolls. However, because of the plurality of pairs of rolls substantial driving pressure can be applied to the wire as previously indicated. In addition, the dual drive between each pair of rolls provides positive driving power. Also, when three or more driving units are used, the device acts as a wire straightener since the tubular wire must pass through the sets of driving rolls in a substantially straight line.

I claim:

1. Apparatus for feeding wire which comprises a support

frame: three pairs of drive rolls rotatably mounted to said support frame to exert a predetermined pressure on the wire when said wire is positioned between said pairs of drive rolls, said rolls mounted so that wire passes between said rolls in a substantially straight line; a wire driving groove which comprises two substantially plane sidewalls which contact each other at an angle of 100° to 150° positioned about the peripheral, smooth surface of each drive roll; a drive gear attached to an outside face of each of the drive rolls; and drive means coacting with each said drive gear for rotating said drive roll at a synchronized speed.

2. The wire feeding apparatus of claim 1 wherein said drive means includes a synchronizing gear rotatably mounted on said support frame which coacts with the drive gears attached to said drive rolls for driving each of said drive gears at the same speed.

3. The wire feeding apparatus of claim 1 wherein biasing means are attached to at least one roll in each pair of rolls for urging said one roll in each pair of rolls against the other roll in said each pair of rolls to place said predetermined pressure on said wire.

4. The wire feeding apparatus of claim 3 wherein said drive means includes a synchronizing gear rotatably mounted on said support frame which coacts with the drive gears attached to said drive rolls for driving each of said drive gears at the same speed.

* * * * *

30

35

40

45

50

55

60

65

70

75