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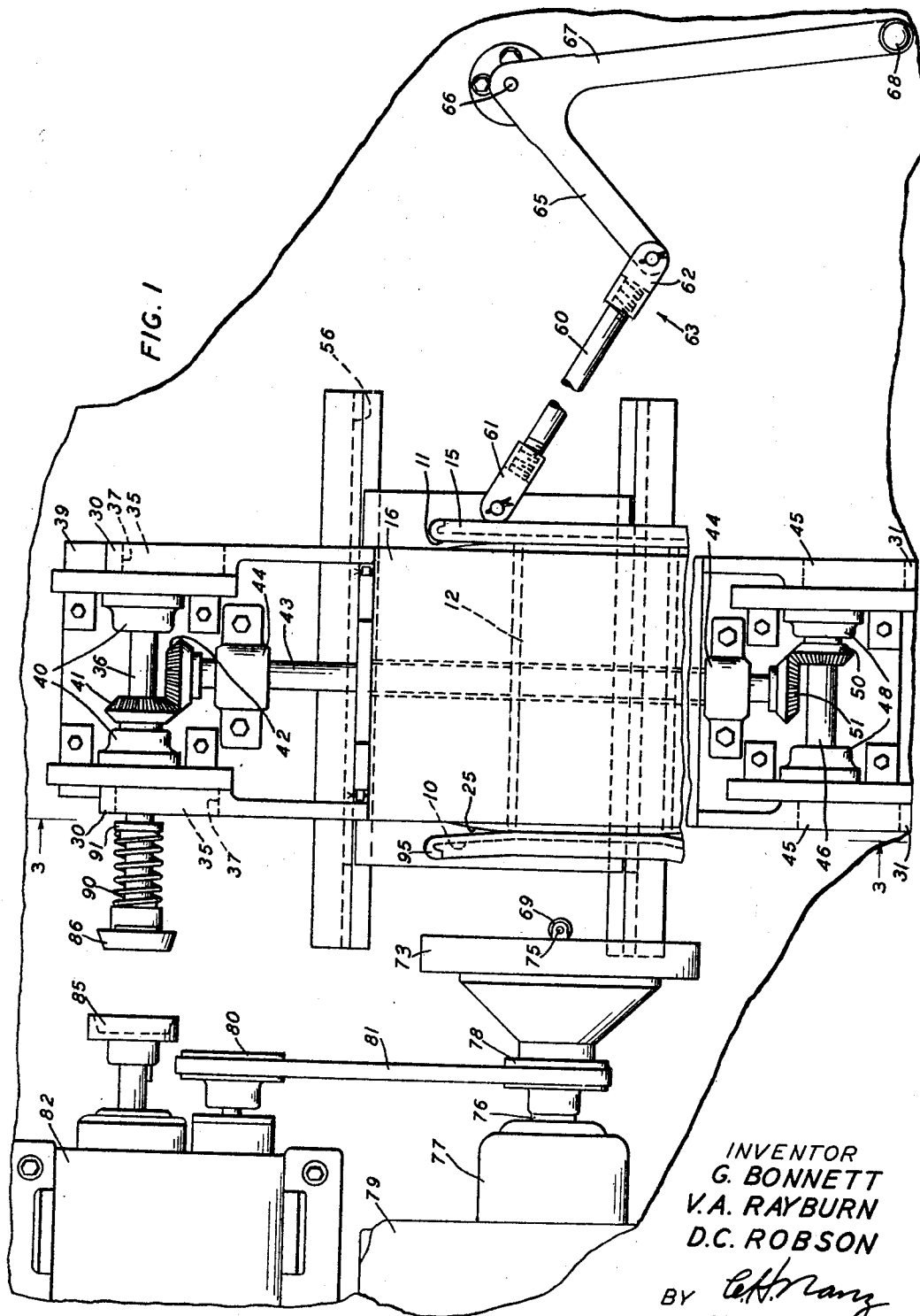
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SPINNING APPARATUS FOR WORKING ARTICLES

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3 Sheets-Sheet 1



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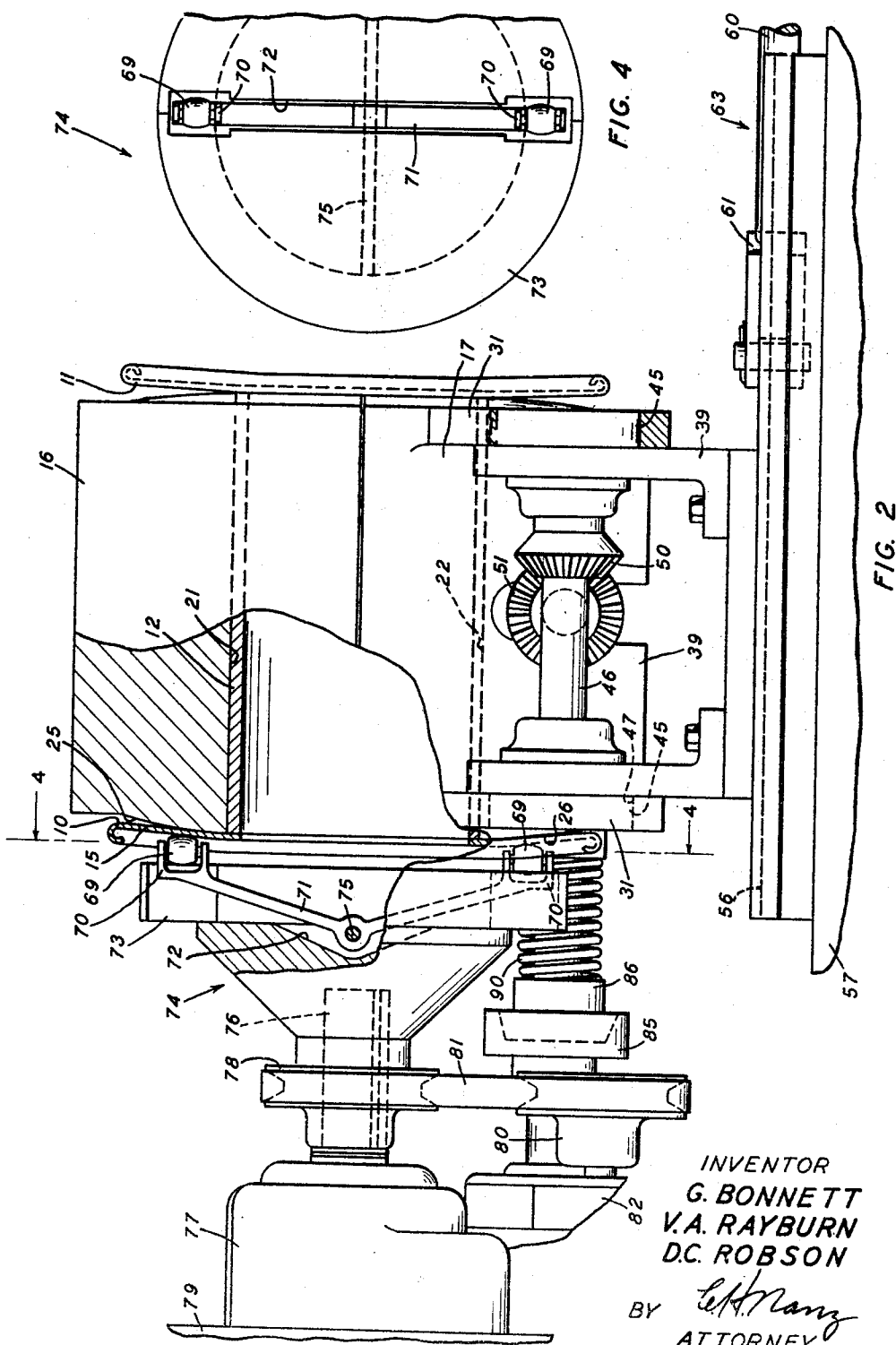
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3 Sheets-Sheet 2



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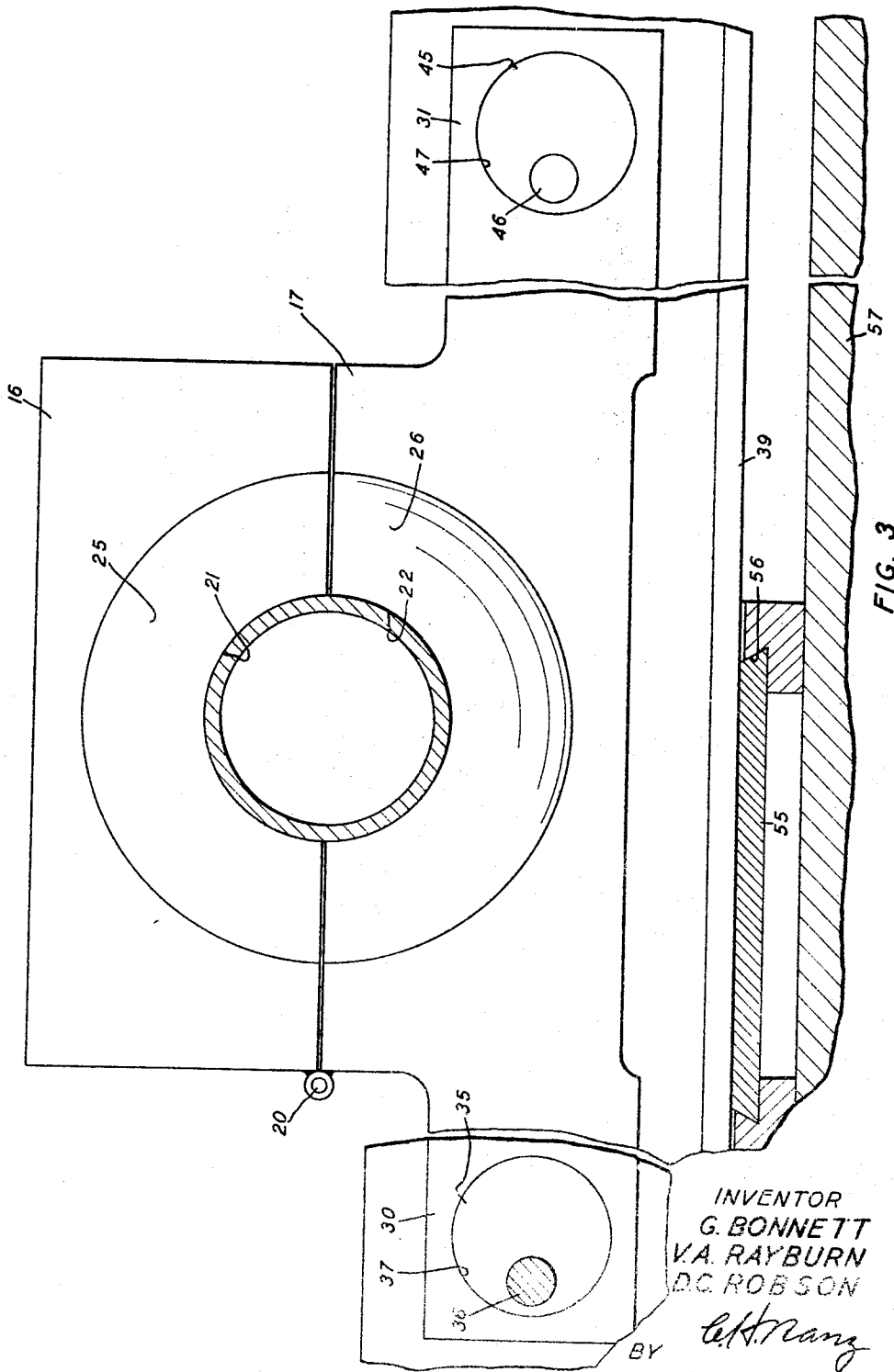
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3 Sheets-Sheet 3



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SPINNING APPARATUS FOR WORKING ARTICLES

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3 Claims. (Cl. 113—52)

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This invention relates to spinning apparatus for working articles, and more particularly to apparatus for straightening spool heads.

In the use of metal spools for storing, conveying and supplying wire, or the like, the heads of the spools sometimes weaken and flare out. Spools having bent heads are difficult to handle with some conveyer systems, and also interfere with uniform distribution of wire on the spools. Non-uniform distribution of wire on the spools sometimes causes the wire to tangle and break as it is unwound from the spools. If the heads are merely bent back to non-flaring positions, their weakness permits relatively rapid re-flaring thereof as they are used.

An object of the invention is to provide new and improved spinning apparatus for working articles.

A further object of the invention is to provide new and improved apparatus for straightening spool heads.

An apparatus illustrative of the invention includes a holder anvil for supporting a spool having a bent head. The holder may be moved toward a spinning head to move the bent spool head into contact with forming elements of the spinning head, and means are provided for revolving the spool with respect to the spinning head so that all portions of the bent spool head are contacted and straightened by the forming elements of the spinning head. The anvil holder is provided with a curved face for supporting the bent spool head, and the forming elements are mounted for floating movement to insure sufficient pressure between the forming elements and any portion of the spool head to straighten the head. In straightening a bent spool head, the spinning head also cold works the head to stiffen it.

A complete understanding of the invention may be obtained from the following detailed description of an apparatus forming a specific embodiment thereof, when read in conjunction with the appended drawings, in which:

Fig. 1 is a fragmentary, top plan view of an apparatus constituting one embodiment of the invention;

Fig. 2 is an enlarged, fragmentary, front elevation of the apparatus with portions thereof shown in section;

Fig. 3 is a fragmentary, vertical section taken along line 3—3 of Fig. 1, and

Fig. 4 is a fragmentary, vertical view taken along line 4—4 of Fig. 2.

Referring now in detail to the drawings, there

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is shown therein an apparatus for straightening and cold working spool heads 10 and 11 fastened to a drum 12 of a metal spool 15. An anvil block 16 hinged to an anvil block 17 by a pintle 20 has a semicylindrical groove 21, which is complementary to a semicylindrical groove 22 formed in an anvil block 17. The semicylindrical grooves 21 and 22 are sufficiently large to receive the drum 12 of the spool 15 therein. When the anvil block 16 is closed upon the anvil block 17, the two anvil blocks serve to clamp the spool 15 against rotation therebetween and are positioned between the spool heads 10 and 11. The anvil blocks 16 and 17 are provided with convex backing faces 25 and 26, which limit movement of the spool head 10 toward the right, as viewed in Fig. 2. That is, the anvil faces prevent the spool head 10 from being bent in too far.

The anvil block 17 is provided with lugs 30—30 and 31—31 (Figs. 1 and 3) and matched eccentric cams 35—35 pinned to a shaft 36 are mounted rotatably in bores 37—37 formed in the lugs 30—30. The shaft 36 is mounted in bearings 40—40 fastened to a carriage 39, and has keyed thereto a bevelled gear 41, which meshes with a bevelled gear 42 keyed to a shaft 43 mounted in bearings 44—44, which are also fastened to the carriage 39. The bearings 40—40 and bearings 48—48 identical therewith prevent movement of the anvil block 17 to the right or left, as viewed in Fig. 1, relative to the carriage. Matched eccentric cams 45—45 pinned to a shaft 46 are mounted rotatably in bores 47—47 formed in the lugs 31—31. The shaft 46 is mounted rotatably in the bearings 48—48, which prevent movement of the lugs 31—31 to the right or left, as viewed in Fig. 1.

A bevelled gear 50 fastened rigidly to the shaft 46 meshes with a bevelled gear 51 keyed to the shaft 43. Hence, when the shaft 36 is rotated, the eccentric cams 35—35 are rotated and the eccentric cams 45—45 are rotated through the gears 41 and 42, the shaft 43, the gears 51 and 50, and the shaft 46. The cams 35—35 are oriented identically angularly with respect to the shaft 36, and the cams 45—45 are fixed to the shaft 46 in angular orientation identical with that of the cams 35—35 with respect to the shaft 36. Also, when the shaft 36 is rotated, the shaft 46 is rotated in the same direction as and at the same rate of speed as the shaft 36. Hence, when the cams 35—35 and 45—45 are rotated, they revolve the anvil blocks 16 and 17.

A dovetail guide member 55 rigidly secured to the carriage 39 is slidable in a dovetail groove 56 formed in a base 57. A rod 60 secured adjustably to clevises 61 and 62 forms a link of a toggle 63. The clevis 61 is pivotally secured to the carriage 39, and the clevis 62 is secured to the link 65 of the toggle. The link 65 is secured pivotally to the base 57 by a pin 66, and is connected rigidly to a crank arm 67 having a grip 68 thereon. When the arm 67 is turned in a clockwise direction, as viewed in Fig. 1, the carriage 39 is moved by the toggle 63 to the left.

Upon sufficient movement of the arm 67, the flange 10 of the reel 15 is moved into engagement with crowned forming rollers 69—69, which are secured to ends 70—70 of a yoke or spider 71. The yoke is mounted floatingly in a slot 72 in a guard 73 of a spinning head 74. A transverse pin 75 secures the yoke 71 pivotally to the spinning head, and the slot 72 is large enough to permit the yoke and the rollers carried thereby to float with respect to the guard of the spinning head. The slot 72 also serves to limit pivotal movement of the yoke with respect to the rotatable head 74. The rollers have axes which are directed radially with respect to the spinning head and transversely to the pin 75, and are free to rotate with respect to the yoke and have portions extending beyond the front face of the guard.

The guard 73 of the spinning head 74 is fixed upon a shaft 76 (Fig. 1) carried by a thrust bearing 77. A pulley 78, secured to the shaft 76, which is driven at a high rate of speed by an electric motor 79, drives a pulley 80 through a belt 81. The pulley 80 drives a gear box 82, which drives a driving clutch member 85. When the carriage 39 is moved toward the spinning head 72, a driven clutch member 86 splined to and slidable on the shaft 36 moves into engagement with the driving clutch member 85. A compression spring 90, which is positioned between the driven clutch member 86 and a collar 91 fastened rigidly to the shaft 36, urges the driven clutch member 86 to the left, as viewed in Fig. 1, but permits the driven clutch member 86 to be moved to the right against the action of the compression spring.

When the driven clutch member 86 is moved into engagement with the driving clutch member 85 as the carriage 39 is moved toward the spinning head 72 to press the spool head 10 against the rollers 69—69, thereby forcing against the anvil blocks 16 and 17 the portions of the spool head 10 contacted by the rollers, the driving clutch member rotates the shaft 36 through the driven clutch member 86. The shaft 36 rotates the eccentric cams 35—35, and the eccentric cams 45—45 are rotated through the bevelled gears 41 and 42, the shaft 43, bevelled gears 50 and 51, and the shaft 46. As the cams 35—35 and 45—45 rotate, they revolve the anvil blocks 16 and 17 around the axis of rotation of the spinning head 74. That is, the anvil blocks and the spool carried thereby are moved transversely with respect to the axis of rotation of the spinning head, so that the rollers 69—69 contact all portions of the head 10 between a rim 95 of the spool head 10 and the drum 12.

The spinning head rotates at a high rate of speed so that it cold works the spool head. The yoke 71 floats so that the rollers 69—69 contact the head 10 with equal forces and press the contacted portions of the head 10 against the convex backing faces 25 and 26 at all times regardless

of alignment or non-alignment of the spool head 10 with respect to the spinning head 74. Also, the crowned rollers have line contacts with the spool head 10 at all times regardless of any possible angular position of the yoke with respect to the spool head point so that there are no point contacts therewith. The rollers press the spool head 10 incrementally against the convex backing faces 25 and 26 of the anvil blocks 16 and 17, respectively, so that all portions of the head 10 are rolled straight.

The spinning head 74 is rotated at a relatively high rate of speed while the anvil blocks 16 and 17 are revolved around the axis of the rotation of the spinning head at a relatively slow rate of speed, which relative rates of speed insure that all portions of the spool head 10 between the drum 12 and the rim 95 of the spool head are rolled by the rollers. The rollers straighten the spool head incrementally and the curvature of the convex backing faces 25 and 26 is such that each deformed portion of the spool head 10 will be bent beyond its elastic limit sufficiently to make the spool head planar, regardless of the distance from the drum that the deformed portion may be. The rollers also cold work the spool head 10 to strengthen it. Thus, the apparatus not only straightens the spool head but strengthens it as well by the cold working, i. e. by the spinning.

In the operation of the apparatus described hereinabove, the spool 15 is placed in the anvil blocks 16 and 17, and is clamped against rotation thereby. The spinning head 74 is rotated at a relatively high rate of speed, and the carriage 39 is moved by the toggle 63 to the left, as viewed in Fig. 1, which moves the driven clutch member 86 into engagement with the driving clutch member 85 so that the anvil blocks 16 and 17 and the spool 15 are revolved about the axis of rotation of the spinning head at a relatively low rate of speed. The carriage 39 is moved further to the left to urge the spool head 10 against the rollers 69—69 and is urged by the toggle constantly toward the spinning head with sufficient force to press the portions of the spool head 10 contacted by the rollers tightly against the backing faces 25 and 26 of the anvil blocks.

The rollers 69—69 press all portions of the head 10 against the annular convex backing faces 25 and 26 of the anvil blocks 16 and 17. This bends the bent portions of the head 10 sufficiently beyond their elastic limits so that they are straightened. The curvature of the convex faces 25 and 26 is such that each increment of the spool head 10 between the drum and the rim thereof is bent the same degree beyond a straightened position thereof so that it will be planar when the force thereon is released.

As one of the rollers 69—69 engages the outer portion of the head 10, it presses that portion against the portion of the anvil holder behind that portion of the head, which is rolled beyond its elastic limit if this portion is bent. The other roller simultaneously engages the portion of the head 10 near the drum 12 and the yoke floats to a position in which both of the rollers press the spool head against the backing faces 25 and 26. The degree that the outer portion of the head 10 is bent beyond its elastic limit is the same as that to which the portion of the spool head 10 adjacent to the drum 12 is bent when this latter portion of the head is engaged by one of the rollers and is pressed against the inner portion of the one of backing faces 25 and 26 behind it.

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After the head 10 of the spool 15 has been straightened, the toggle 33 may be actuated to move the carriage 39 away from the spinning head 74 and the anvil blocks 16 and 17 may be opened so that the spool 15 may be removed therefrom. The head 11 then may be straightened and strengthened in a similar manner, if necessary, after reversing the spool in the anvil blocks. The driven clutch member 38 is moved out of engagement with the driving clutch member 85 when the carriage 39 is moved to a position for unloading and loading a spool in the anvil blocks 16 and 17 so that the anvil blocks 16 and 17 are not revolved during the unloading and loading steps, whereby these steps are facilitated.

The apparatus described hereinabove serves to straighten the portions of bent spool heads between the rims of the heads and the drum of the spool so that the spool heads are completely and incrementally straightened. The apparatus cold works the spool heads as well as straightening them, thereby strengthening the heads to prolong their useful service. The apparatus also may be used to cold work spool heads which are not bent or deformed if strengthening of such unbent spool heads is needed.

What is claimed is:

1. An apparatus for straightening heads of metal spools, which comprises a spinning head rotatable about a predetermined axis and including a forming element carried laterally of the axis of rotation thereof, means for rotating the spinning head at a relatively high rate of speed, a carriage movable toward and away from the spinning head in a direction parallel with the axis of rotation of the spinning head, a holder carried by the carriage for holding a spool in a position in which the axis of a drum portion of the spool is parallel with the axis of rotation of the spinning head, said holder being provided with a curved backing face for supporting a head of the spool, at least one eccentric cam for supporting the holder on the carriage and for revolving the holder around the axis of rotation of the spinning head when the cam is rotated, and means for rotating the eccentric cam when the carriage is moved toward the spinning head.

2. An apparatus for straightening heads of spools, which comprises a disc rotatable about a predetermined axis, a plurality of rollers carried by the disc in positions in which they are offset from the axis of rotation of the disc and in which axes the rotation of the rollers are substantially radial with respect to the disc, a carriage movable toward and away from the disc along a line parallel with the axis of rotation of the disc, a

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toggle joint linkage for moving the carriage toward and away from the disc, a plurality of matched eccentric cams mounted on the carriage, an anvil carried by the eccentric cams for holding a reel in position in which the axis of the reel is parallel with the axis of rotation of the disc, means including a shaft extending parallel to the axis of rotation of the disc for rotating the eccentric cams in synchronization to revolve the anvil around the axis of the rotation of the disc when the shaft is rotated, means for rotating the disc, means for driving the disc-rotating means, a driving clutch member driven by the driving means and positioned in alignment with the shaft, a driven clutch member slidably mounted on the end of the shaft for engaging the driving clutch member, and means for urging the driven clutch member toward the driving clutch member.

3. An apparatus for cold working articles, which comprises a holder for holding an article, said holder having a curved backing plate to support one side of an article held by the holder, a shaft juxtaposed to the backing plate at the other side of said article, means for rotating the shaft at a high rate of speed, a yoke mounted pivotally on an axis extending transversely to the shaft, a pair of spinning elements carried on radially extending axles on the ends of the yoke, said axles extending transversely of said yoke axis, means for pressing said other side of the article and the spinning elements into engagement, and means for effecting relative movement between the article and the spinning elements transverse to the axis of rotation of the shaft.

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