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PROCESS AND APPARATUS FOR STRAIGHTENING AND FEEDING WIRE

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Fig. 1

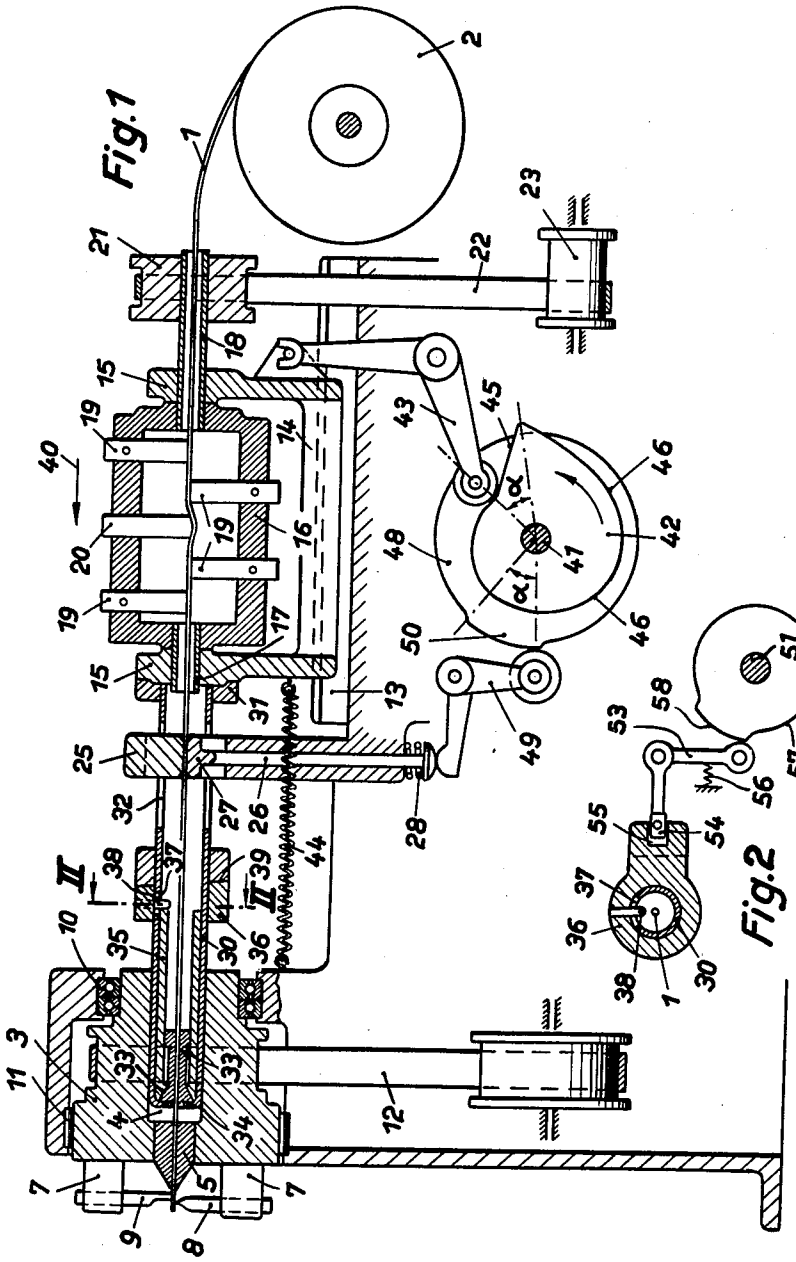


Fig. 2

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PROCESS AND APPARATUS FOR STRAIGHTENING AND FEEDING WIRE

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9 Claims. (Cl. 153—86)

The present invention relates to automatic lathes and more particularly to an automatic lathe which works on an elongated wire which is automatically fed to a working station of the lathe.

With machines of the above type the wire which is to be worked on is drawn automatically from a reel of wire and is fed to the working station of the lathe where cutting tools operate on the wire and where the wire is cut into pieces of desired length. Inasmuch as the wire is drawn from a reel, it is necessary to straighten the wire before it is worked on, and the known machines for accomplishing these results are exceedingly complicated since they require wire straightening devices which must be controlled through a complicated apparatus as well as wire feeding devices for feeding the wire to the working station. Moreover, with these known machines, the wire, which is easily bent, is not supported in a manner which absolutely resists bending of the wire during working thereof, and as a result it is difficult to work precisely on wire with the known machines.

One of the objects of the present invention is to overcome the above drawbacks by providing a machine of the above type with a wire straightening device which includes no moving parts and which need only be reciprocated along the path through which the wire moves from the reel toward the working station.

Another object of the present invention is to use such a wire straightening device not only for straightening the wire, but also for feeding the wire to the working station.

A further object of the present invention is to provide a machine of the above type with a means for rigidly holding the wire during the working thereof at a point located extremely close to the working station so that the possibility of bending of the wire is reduced to a minimum.

An additional object of the present invention is to provide an exceedingly simple control apparatus for controlling the above structure.

It is also an object of the present invention to provide an apparatus capable of accomplishing all of the above objects and at the same time being made up of simple and ruggedly constructed parts which are very reliable in operation.

With the above objects in view the present invention mainly consists of an apparatus for straightening wire and feeding the same to an automatic lathe, this apparatus including a support means and a wire straightening means carried by the support means for reciprocating movement thereon along the path through which the wire moves to the working station of the lathe. A moving means is operatively connected to the straightening means for moving the latter in a feeding direction toward the working station and in a direction opposite to the feeding direction. A clamping means clamps the wire to hold the same stationary only during the time that the moving means moves the straightening means in the said direction opposite to the feeding direction, so that the wire is straightened while clamped by the clamping means and so that the straightening device itself feeds the wire to the working station during movement of the straightening means in the feeding direction.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantage thereof, will be best understood from the following description of specific embodiments when read in connection with the accompanying drawings, in which:

Fig. 1 is a partly fragmentary, partly schematic, sectional elevational view of an apparatus constructed in accordance with the present invention; and

Fig. 2 is a fragmentary sectional, partly schematic view taken along the line II—II of Fig. 1 in the direction of the arrows.

Referring now to the drawings, the wire **1** is fed to the machine from a reel **2** turnably carried by the machine in any known way. In a manner described below, the wire is guided to and through an annular tool carrier **3**. A sleeve **5** is fixed within and is coaxial with tool carrier **3**, the wire **1** extending through the sleeve **5** to be guided thereby and maintained thereby at the axis of the tool carrier **3** during rotation of the latter. The tool carrier **3** carries in a known way not forming part of the present invention radially movable tool holders **7** which in the illustrated example respectively carry a cutting tool **8** and a cutting off tool **9**.

The lathe of the invention includes a support means which supports the tool carrier **3** for rotation about its axis, the tool carrier being supported at its rear end portion by ball bearings **10** and at its front end portion by an elongated, needle-type roller bearing **11**. A belt **12** drives the tool carrier **3** in the manner shown diagrammatically in Fig. 1, and this belt **12** engages the tool carrier **3** between the bearings **10** and **11**.

A wire straightening means **16** is supported by a carriage **14** for reciprocating movement along the guideways **13** of the lathe along the axis of the tool carrier **3**. The straightening means **16** includes a cylindrical housing having hollow axially extending bearing pins **17** and **18** through which the wire **1** passes, these bearing pins **17** and **18** being turnably carried by the carriage **14**. A plurality of wire engaging jaws **19** extend radially into the interior of the housing, and a particular feature of the invention resides in the fact that these wire engaging jaws remain stationary with respect to the housing during the entire operation. The jaws **19** are, however, adjustable with respect to the housing so that these jaws **19** may be moved when the apparatus is being set up so that the jaws **19** may be adapted for wires of different diameters and may permit the wire to be easily passed through the straightening device. An additional jaw **20** extends into the housing beyond the jaws **19**, and the arrangement is such that the jaws **19** only engage the outer surface of the wire while the jaw **20** bends the wire, this jaw **20** also being stationary with respect to the housing during the entire operations but being adjustable with respect thereto for setting up purposes, in the same way as the jaws **19**. The structure for setting of jaws **19** and **20** in the wire straightening device forms no part of the present invention and may take any suitable form.

As apparent from Fig. 1, the bearing pin **18** carries a pulley **21** which is rotated by a belt **22**, pulley **21** being fixed to the hollow bearing pin **18** so that the wire straightening device is rotated by rotation of the pulley **21**, and, as is shown diagrammatically in Fig. 1, the belt **22** is driven by a pulley **23** which is long enough to allow

the belt 22 to move along the pulley 23 during reciprocation of the carriage 14 along the support means 13.

A clamping means 25 is fixed to a stationary part of the support means of the machine and is located between the tool carrier 3 and the straightening means 16. This clamping means includes a rod 26 carrying at its top end a jaw 27 which cooperates with the top stationary portion of the clamping means to clamp the wire upon upward movement of elements 26 and 27, as viewed in Fig. 1. The lower end of rod 26 is headed, as shown in Fig. 1, and a spring 28 urges the rod 26 and jaw 27 downwardly so that it is necessary to overcome the force of spring 28 in order to move elements 26 and 27 upwardly to their clamping position shown in Fig. 1.

The carriage 14 carries at its end which is nearest the tool carrier 3 a tubular member 30 through which the wire 1 passes. In the illustrated example the tubular member 30 is removably fixed to the front end of the carriage 14 by an annular member 31 fixed on the one hand to member 30 and on the other hand to carriage 14 through removable screws or the like. The tubular member 30 is provided with a pair of top and bottom aligned cutouts 32 through which the stationary clamping means 25 extends, as shown in Fig. 1, and the cutouts 32 are long enough to provide free movement of member 30 together with carriage 14 without engagement between the clamping device 25 and the tubular member 30.

At the interior of the front, free end portion of tubular member 30, a collet 33 is located, and it will be noted that the front end of collet 33 engages the front end wall of tubular member 30. The collet 33 is moved to its clamping position by a collet operating member 35 which is itself tubular and which is located within the tube 30, the operating member 35 having at its front end a conical inner face engaging the outer faces 33' of the jaws of the collet 33. The inherent springiness of the jaws of collet 33 is sufficient to move these jaws to their open position and to shift the operating member 35 to the right, as viewed in Fig. 1, this operating member 35 being moved to the left, by a means now to be described, for moving the jaws of the collet toward each other so as to clamp the wire 1.

Thus, as may be seen from Figs. 1 and 2, a ring member 36 is located on the tubular member 30 for free turning movement thereabout, and this ring member 36 is provided with a pin 38 extending through a cutout 37 of tubular member 30 into the interior of the latter to engage the rear end of the operating member 35. The rear face of ring member 36 is located in a plane which is inclined to the axis of tubular member 30 at an angle other than a right angle. This inclined rear face of ring 36 engages a similarly inclined front face 39 of a second ring which is fixed to the tubular member 30 or which may be formed integrally with the tubular member 30. Thus, when the ring 36 is turned the engagement between ring 36 and face 39 will cause the ring 36 to move along a helical path and therefore the pin 38 will move forwardly or rearwardly to actuate the operating member 35.

As is apparent from Fig. 1 the tubular member 30 extends well into the axial bore 4 of the tool carrier 3 and is in slidable engagement with the latter. The arrangement is such that in the forward position of the carriage 14 the front end of the tubular member 30 is located almost up to the rear face of sleeve 5 so that the smallest possible length of the wire 1 is located between sleeve 5 and collet 33 and in this way the possibility of bending of the wire is reduced to a minimum.

The feeding direction of the wire 1 is indicated in Fig. 1 by the arrow 40. The straightening of the wire takes place when the straightening means 16 is moved to the right, as viewed in Fig. 1, in a direction opposite to arrow 40, and during this movement of the straightening device 16 to the right the clamping means 25 grips the wire so that the straightening means 16 moves relatively to the wire which is this time held stationary by the clamping means 25. The collet 33 is in its unclamped position during this time so that it rides rearwardly along the wire which is held by the clamping means 25. It is during this rearward movement of the carriage 14 and the parts connected thereto that the working of the wire by the tools 8 and 9 takes place, the tool 8 cutting into the wire to form any desired grooves or the like therein, for example, and the tool 9 cutting off a wire piece of desired length. At the end of the straightening stroke of the straightening means 16 to the right, as viewed in Fig. 1, the clamping means 25 is released so that during the following movement of the straightening means 16 in the feeding direction of arrow 40, the wire is fed by the straightening means in such a way that a given length of wire extends forwardly beyond the sleeve 5. Just before the straightening device begins its movement in the feeding direction the collet 33 is operated by member 35 to clamp the wire so that the latter is held with respect to the straightening device 16 by the collet 33. Thus, it is the straightening device 16 itself which feeds the wire through the sleeve 5.

The movement of the carriage 14 and the opening and closing of the clamping device 25 is controlled in the illustrated example from the same cam shaft 41. A cam 42 is fixed to the cam shaft 41 for rotation therewith, and this cam 42 cooperates with a bell crank 43 which is pivotally carried by the support means of the machine and which has a roller in continuous engagement with the cam 42. Thus, the arm of lever 43 which extends downwardly to the left in Fig. 1 carries its roller at its free end while the arm of bell crank 43 which extends upwardly as viewed in Fig. 1 has a groove extending into the same from its top end and engaging a pin fixed to a leg extending rearwardly from carriage 14. This groove of the lever 43 is long enough to maintain the lever 43 in engagement with the pin of carriage 14 throughout the entire angle through which the lever 43 is turned by the cam 42. A spring 44 is fixed at one end to the stationary support means of the machine and at its opposite end to the carriage 14 to urge the latter to the left, as viewed in Fig. 1, so as to maintain the roller of lever 43 in engagement with the cam 42. The cam 42 rotates with shaft 41 in a counterclockwise direction, as shown by the arrows of Fig. 1. The cam portion 45 of cam 42 turns the lever 43 in a clockwise direction so as to move the carriage 14 and straightening means 16 in the direction opposite to arrow 40 for straightening the wire. The portion 46 of cam 42 controls the feeding movement of the carriage 14 in the direction of arrow 40 and this portion 46 is divided into a plurality of arcuate parts arranged end to end and each being concentric with the shaft 41 so that the required forward movements and stationary periods of the wire are provided.

A second cam 48 is fixed to the shaft 41 for rotation therewith and controls the opening and closing of the clamping means 25. A bell crank lever 49 is turnably carried by the support means, has a roller at the end of one arm in engagement with the periphery of cam 48, and has its other arm in engagement with the bottom end of the rod 26. The spring 28 maintains the roller of lever 49 in engagement with the cam 48. When this roller is located on the cam portion 50 of the cam 48 the wire is clamped by the clamping means 25. The cam portion 50 of cam 48 and the cam portion 45 of cam 42 both extend about the axis of shaft 41 through the same angle α and both start and end their engagement with the levers 49 and 43, respectively, at the same time so that the clamping means 25 is in its clamping position exactly during the time that the straightening means 16 moves to the right along its wire straightening stroke.

In order to control operating member 35 for operating the collet 33, a second cam shaft 51 is provided (Fig. 2), and this cam shaft 51 carries a cam 52. A bell crank 53

is turnably carried by the support means of the machine, has at an end of one arm a roller in engagement with cam 52, and has fixed to its other arm a pin which extends turnably into the bore of a block 54 which is slidable within a groove 55 of an extension of the ring 36. A spring 56 engages the support means of the machine with its left end, as viewed in Fig. 2, and engages the lever 53 with its right end so as to urge the lever 53 in a counterclockwise direction, as viewed in Fig. 2, and in this way the lever 53 is maintained in operative engagement with the cam 52. The cam 52 is provided with a pair of arcuate portions 57 and 58 located along concentric circles of different radii. When the roller of lever 53 moves from one of these arcuate portions to another arcuate portion, the ring 36 is turned and in the above-described manner moves the tubular operating member 35 to the left, as viewed in Fig. 1, for moving the collet 33 to its clamping position, or frees the operating member 35 for movement to the right, as viewed in Fig. 1, with respect to the tubular member 30. The location and size of the arcuate portions 57 and 58 are such that the collet 33 is in its clamping position as long as the carriage 14 moves in the direction of the arrow 40 and is in its open position as long as the carriage moves to the right in its wire straightening stroke so that the collet 33 may move along the wire which is clamped by the clamping means 25. To move the cam 52 in the desired timed sequence, the shaft 51 may be coupled in any well known manner, not forming part of the present invention, with shaft 41 for rotation therewith at the same rotational speed.

It will be understood that each of the elements described above, or two or more together, may also find a useful application in other types of automatic lathes differing from the types described above.

While the invention has been illustrated and described as embodied in means for feeding wire to automatic lathes, it is not intended to be limited to the details shown, since various modifications and structural changes may be made without departing in any way from the spirit of the present invention.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can by applying current knowledge readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the following claims.

What is claimed as new and desired to be secured by Letters Patent is:

1. Apparatus for straightening wire and feeding the same to a working station, comprising, in combination, support means; wire straightening means carried by said support means for reciprocating movement thereon along the path through which the wire moves to the working station; moving means operatively connected to said straightening means to move the latter in a feeding direction toward said working station and in a direction opposite to said feeding direction; clamping means carried by said support means and located between said wire straightening means and said working station for clamping the wire; means operatively connecting said clamping and moving means to hold the wire stationary only during the time that said moving means moves said straightening means in said opposite direction, whereby the wire is straightened while clamped by said clamping means and whereby said straightening means feeds the wire to the working station during movement of said straightening means in said feeding direction; a tubular member fixed to said straightening means for reciprocation therewith and extending forwardly therefrom toward the working station, said tubular member having its axis located along the path of wire movement so that the wire moves through said tubular member, the latter having a free end located adjacent the working station and spaced from said wire straightening means farther than said clamping means; a collet carried by said tubular member adjacent said free end thereof and being coaxial with said tubular member; and collet operating means engaging said collet to release the same from wire passing therethrough during movement of said collet and tubular member with said straightening means in said opposite direction and to clamp the wire with said collet during movement of the latter and said tubular member with said straightening means in said feeding direction.

2. Apparatus for straightening wire and feeding the same to a working station, comprising, in combination, support means; wire straightening means carried by said support means for reciprocating movement thereon along the path through which the wire moves to the working station; moving means operatively connected to said straightening means to move the latter in a feeding direction toward said working station and in a direction opposite to said feeding direction; clamping means carried by said support means and located between said wire straightening means and said working station for clamping the wire; means operatively connecting said clamping and moving means to hold the wire stationary only during the time that said moving means moves said straightening means in said opposite direction, whereby the wire is straightened while clamped by said clamping means and whereby said straightening means feeds the wire to the working station during movement of said straightening means in said feeding direction; a tubular member fixed to said straightening means for reciprocation therewith and extending forwardly therefrom toward the working station, said tubular member having its axis located along the path of wire movement so that the wire moves through said tubular member, the latter having a free end located adjacent the working station and spaced from said wire straightening means farther than said clamping means; a collet carried by said tubular member adjacent said free end thereof and being coaxial with said tubular member; and collet operating means engaging said collet to release the same from wire passing therethrough during movement of said collet and tubular member with said straightening means in said opposite direction and to clamp the wire with said collet during movement of the latter and said tubular member with said straightening means in said feeding direction.

3. Apparatus for straightening wire and feeding the same to a working station, comprising, in combination, support means; wire straightening means carried by said support means for reciprocating movement thereon along the path through which the wire moves to the working station; moving means operatively connected to said straightening means to move the latter in a feeding direction toward said working station and in a direction opposite to said feeding direction; clamping means located between said wire straightening means and said working station for clamping the wire; means operatively connecting said clamping and moving means to hold the wire stationary only during the time that said moving means moves said straightening means in said opposite direction, whereby the wire is straightened while clamped by said clamping means and whereby said straightening means feeds the wire to the working station during movement of said straightening means in said feeding direction; a tubular member fixed to said straightening means for reciprocation therewith and extending forwardly therefrom toward the working station, said tubular member having its axis located along the path of wire movement so that the wire moves through said tubular member, the latter having a free end located adjacent the working station and spaced from said wire straightening means farther than said clamping means, said tubular

member being formed with a cutout intermediate the ends thereof; a collet carried by said tubular member adjacent said free end thereof and being coaxial with said tubular member; a collet operating member located in said tubular member for movement toward said free end thereof to move the collet to its wire clamping position and away from said free end thereof to release the collet to move to its wire releasing position, said operating member having a portion located at said cutout of said tubular member; and annular means turnably carried by said tubular member and extending through said cutout thereof into engagement with said operating member for shifting the latter toward said free end of said tubular member when said straightening device moves in said feeding direction and for freeing said operating member for movement away from said free end of said tubular member during movement of said straightening device in said opposite direction.

4. Apparatus for straightening wire and feeding the same to a working station, comprising, in combination, support means; wire straightening means carried by said support means for reciprocating movement thereon along the path through which the wire moves to the working station; moving means operatively connected to said straightening means to move the latter in a feeding direction toward said working station and in a direction opposite to said feeding direction; clamping means carried by said support means and located between said wire straightening means and said working station for clamping the wire; means operatively connecting said clamping and moving means to hold the wire stationary only during the time that said moving means moves said straightening means in said opposite direction, whereby the wire is straightened while clamped by said clamping means and whereby said straightening means feeds the wire to the working station during movement of said straightening means in said feeding direction; a tubular member fixed to said straightening means for reciprocation therewith and extending forwardly therefrom toward the working station, said tubular member having its axis located along the path of wire movement so that the wire moves through said tubular member, the latter having a free end located adjacent the working station and spaced from said wire straightening means farther than said clamping means, said tubular member being formed with a cutout intermediate the ends thereof; a collet carried by said tubular member adjacent said free end thereof and being coaxial with said tubular member; a collet operating member located in said tubular member for movement toward said free end thereof to move the collet to its wire clamping position and away from said free end thereof to release the collet to move to its wire releasing position, said operating member having a portion located at said cutout of said tubular member; annular means turnably carried by said tubular member and extending through said cutout thereof into engagement with said operating member for shifting the latter toward said free end of said tubular member when said straightening device moves in said feeding direction and for freeing said operating member for movement away from said free end of said tubular member during movement of said straightening device in said opposite direction; and cam means operatively connected to said annular means for operating the latter.

5. Apparatus for straightening wire and feeding the same to a working station, comprising, in combination, support means; wire straightening means carried by said support means for reciprocating movement thereon along the path through which the wire moves to the working station; moving means operatively connected to said straightening means to move the latter in a feeding direction toward said working station and in a direction opposite to said feeding direction; clamping means carried by said support means and located between said wire straightening means and said working station for clamping the wire; means operatively connecting said clamping and moving means to hold the wire stationary only during the time that said moving means moves said straightening means in said opposite direction, whereby the wire is straightened while clamped by said clamping means and whereby said straightening means feeds the wire to the working station during movement of said straightening means in said feeding direction; a tubular member fixed to said straightening means for reciprocation therewith and extending forwardly therefrom toward the working station, said tubular member having its axis located along the path of wire movement so that the wire moves through said tubular member, the latter having a free end located adjacent the working station and spaced from said wire straightening means farther than said clamping means; a collet carried by said tubular member adjacent said free end thereof and being coaxial with said tubular member; collet operating means engaging said collet to release the same from wire passing therethrough during movement of said collet and tubular member with said straightening means in said opposite direction and to clamp the wire with said collet during movement of the latter and said tubular member with said straightening means in said feeding direction; an annular tool carrier rotatably carried by said support means for rotation about an axis coinciding with the path of wire movement, said tubular member extending with its front free end portion slidably into said annular tool carrier; and a sleeve located ahead of said tubular member and fixed coaxially to said tool carrier for guiding the wire along said axis.

6. Apparatus for straightening wire and feeding the same to a working station, comprising, in combination, support means; wire straightening means carried by said support means for reciprocating movement thereon along the path through which the wire moves to the working station; moving means operatively connected to said straightening means to move the latter in a feeding direction toward said working station and in a direction opposite to said feeding direction; clamping means carried by said support means and located between said wire straightening means and said working station for clamping the wire; means operatively connecting said clamping and moving means to hold the wire stationary only during the time that said moving means moves said straightening means in said opposite direction, whereby the wire is straightened while clamped by said clamping means and whereby said straightening means feeds the wire to the working station during movement of said straightening means in said feeding direction; a tubular member fixed to said straightening means for reciprocation therewith and extending forwardly therefrom toward the working station, said tubular member having its axis located along the path of wire movement so that the wire moves through said tubular member, the latter having a free end located adjacent the working station and spaced from said wire straightening means farther than said clamping means, said tubular member being formed with a cutout intermediate the ends thereof; a collet carried by said tubular member adjacent said free end thereof and being coaxial with said tubular member; a collet operating member located in said tubular member for movement toward said free end thereof to move the collet to its wire clamping position during movement of said collet and tubular member with said straightening means in said feeding direction and away from said free end thereof to release the collet to move to its wire releasing position during movement of said collet and tubular member with said straightening means in said opposite direction, said operating member having a free end portion located at said cutout of said tubular member; a first ring portion fixed to said tubular member adjacent said cutout thereof and having a front face located in a plane inclined to the axis of said tubular member at an angle other than a right angle; a second ring portion turnably carried by

said tubular member ahead of said first ring portion and having a rear face located in said plane and engaging said front face of said first ring portion; a pin fixed to said second ring portion and extending through said cut-out of said tubular member into the latter into engagement with said end portion of said operating member; and means operatively connected to said second ring portion for turning the latter about said tubular member so that said pin urges said operating member forwardly to a clamping position or frees said operating member for movement rearwardly to release said collet.

7. Arrangement for straightening wire and feeding the same to a working station, comprising, in combination, support means; wire straightening means carried by said support means for reciprocating movement thereon along the path through which the wire moves to the working station movably in a feeding direction toward said working station and in a direction opposite to said feeding direction away from said working station; blocking means preventing movement of said wire in a direction opposite to said feeding direction away from said working station, said means being located in direction of the path through which the wire moves after said wire straightening means; wire gripping means carried by said support means for reciprocating movement thereon along the path through which the wire moves to the working station, said wire gripping means being located spaced from said straightening means between said blocking means and said working station and being movable between wire gripping and wire releasing positions; moving means operatively connected to both said wire straightening means and wire gripping means for simultaneously moving the same in a feeding direction toward said working station and in a direction opposite to said feeding direction during which latter movement said wire straightening means straightens the wire while the same is prevented from moving in a direction opposite feeding direction by said blocking means; and means for maintaining said wire gripping means in wire gripping position while said wire straightening means and gripping means are moved in feeding direction and for maintaining said wire gripping means in wire releasing position while said wire straightening means and said wire gripping means are moved by said moving means in a direction opposite to said feeding direction.

8. A process for straightening and feeding wire, comprising the steps of clamping a leading portion of the wire; straightening a portion of the thus-clamped wire

by moving a wire straightening device therealong in one direction up to a given point of the wire; gripping the thus straightened wire at a point spaced forwardly of said given point at a given distance; moving said wire in feeding direction opposite to said one direction by moving said gripped point and said wire straightening device in said feeding direction while maintaining said grpped point at a constant distance from said wire straightening device; releasing said gripped point; and repeating said steps of clamping, straightening and unclamping of said wire before gripping said wire again at a point located rearwardly of said previously gripped point and at the same constant distance from said wire straightening device.

9. A process for straightening wire and feeding the same to a working station, comprising the steps of clamping a leading portion of the wire; straightening a portion of the thus-clamped wire by moving a wire straightening device therealong in one direction up to a given point of the wire; gripping the thus straightened wire at a point spaced forwardly of said given point a given distance; moving said wire in feeding direction opposite to said one direction by moving said gripped point and said wire straightening device in said feeding direction while maintaining said gripped point at a constant distance from said wire straightening device, at the end of the movement of said wire in feeding direction, said gripped point being adjacent said working station; guiding said wire between said gripped point and said working station; releasing said gripped point; and repeating said steps of clamping, straightening and unclamping of said wire before gripping said wire again at a point located rearwardly of said previously gripped point and at the same constant distance from said wire straightening device.

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