

Aug. 27, 1957

E. C. PLANETT

2,804,196

DEVICE FOR DESCALING AND CLEANING WIRE ROD

Filed April 27, 1954

Fig. 1.

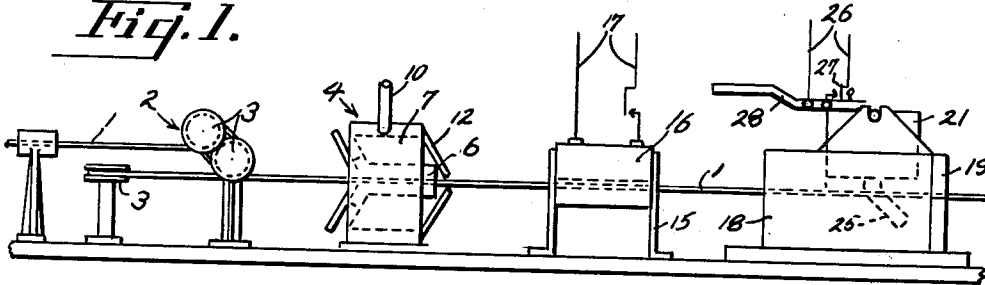


Fig. 2.

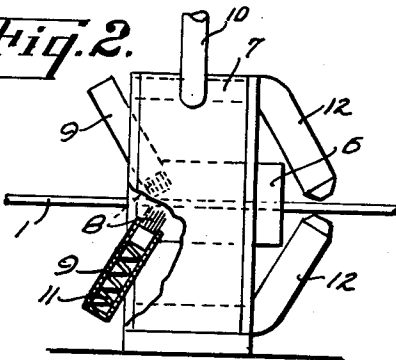


Fig. 3.

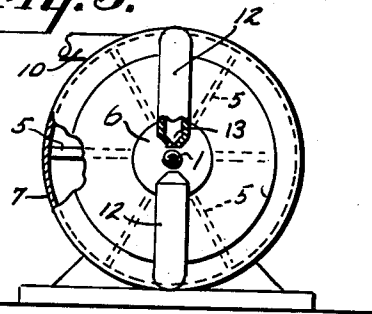


Fig. 4.

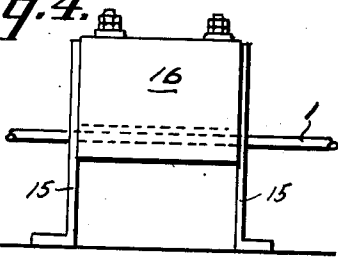


Fig. 5.

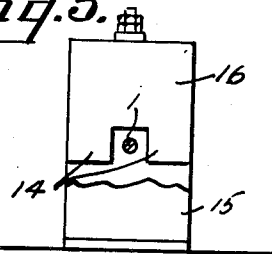


Fig. 6.

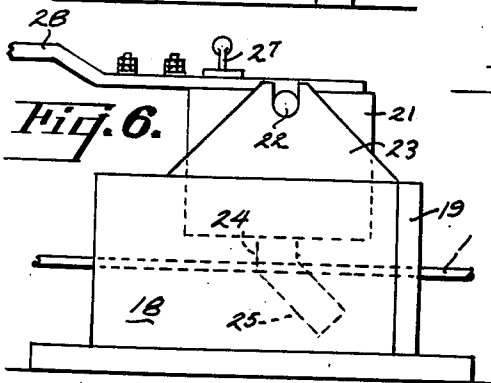
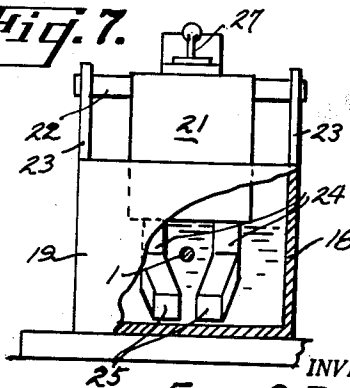


Fig. 7.



INVENTOR.
EARL C. PLANETT
BY
Mellin and Hanson
ATTYS.

1

2,804,196

DEVICE FOR DESCALING AND CLEANING WIRE ROD

Earl C. Planett, San Marino, Calif.

Application April 27, 1954, Serial No. 425,983

4 Claims. (Cl. 205—22)

This invention relates to the descaling and cleaning of hot rolled wire rod stock in preparation for making cold drawn wire.

In the manufacture of cold drawn wire from hot rolled wire rod, the stock material is drawn through a succession of dies to progressively reduce the diameter of the material to a desired dimension. Ordinarily, a reduction of about 30% is obtained through each pass. As the stock rod is fed to the first of the series of dies, it is usually passed through a chamber, commonly called the "soap box," containing a mobile lubricant commonly called "soap." The lubricant comprises a grease or fat base containing various agents compounded to meet varying requirements, and serves to lubricate the rod and hold down the relatively high temperature which is developed as the stock rod is drawn through the die.

It is important that the wire rod be freed of all scale, such as that ordinarily produced by acid pickling, before the rod is passed through the first die. Even a small particle of scale carried on the rod may lodge in the die and cause objectionable scoring of the rod, or the die, or both. To effectually remove the scale and clean the rod in preparation for the cold drawing operation, it has been a common practice to subject the stock to a "pickling" process. In that practice, the rod material is repeatedly submerged in acid and washed with water directed onto the rod at high pressure to remove scale, and finally submerged in lime or borax solution. Such treatment is costly and messy, slows production, and requires valuable factory space and expensive equipment.

Efforts have heretofore been made to obviate the pickling treatment, as, for example, by subjecting the rod material to bending over a plurality of relatively sharp angles for loosening the scale and thereafter subjecting the rod to mechanical treatments of various kinds for removing the scale particles from the rod. The results have been discouraging because of a number of operational factors encountered in commercial practice, and especially because of the tendency of small particles of the scale to cling to the rod in spite of such treatments. Small particles thus clinging to the rod are carried thereby into the soap box. There, many of the particles will be removed by the lubricant through which they become scattered. A few may be carried directly to the die where they may lodge and thereafter cause a continuing scoring of the wire and perhaps permanent damage to the die. The accumulation of scale particles in the lubricant increases the likelihood that one or more may lodge in the die.

It is an object to provide an improved method and apparatus by which all particles of scale may be removed from the stock, as it is fed to the first die of a wire drawing machine, and so reduce the likelihood that a scale particle may reach the die that, therefore, that possibility may be ignored.

A further object is to provide a device for descaling and cleaning wire rod stock in which magnetic means operate to attract and hold scale particles that may still

2

cling to the rod after it has passed through mechanical treatment by which the scale is loosened and substantially completely removed from the rod.

A still further object is to provide a device of the character described wherein wire rod material fed to a wire drawing machine is passed through a magnetic field operative within a lubricant chamber associated with the first of a succession of wire drawing dies for collecting scale particles carried into the chamber by the rod.

The invention has other objects and features of advantage, some of which with the foregoing will be explained in connection with the embodiment of the invention selected for illustration in the drawings forming a part of the present specification. It is to be understood that the invention is not limited to the specific embodiment illustrated, as it may be otherwise embodied within the definition of the appended claims.

In the drawings:

Fig. 1 is a schematic view diagrammatically illustrating the course of wire rod through successive phases of the descaling and cleaning operation as the rod is fed to a wire drawing machine.

Fig. 2 is a front elevational view, partly in section, of a scale removing rotor of the character contemplated by the invention.

Fig. 3 is a side elevational view, partly in section, of the unit shown in Fig. 2.

Figs. 4 and 5 are front and side elevational views, respectively, of a magnet operable in accordance with the invention.

Fig. 6 is a front elevational view of a lubricant chamber equipped with a magnet in accordance with the invention.

Fig. 7 is a side elevational view of the unit shown in Fig. 6, parts being broken away and shown in section.

In terms of broad inclusion, the rod descaling and cleaning device of this invention comprises mechanical means for loosening and displacing substantially all scale carried by wire rod as it is fed to a wire drawing machine, and magnetic means mounted between the mechanical descaling means and the first die of the machine for attracting and holding any scale particles which may still cling to the rod, whereby such particles may be removed and prevented from entering the die as the rod is moved therethrough. Preferably, the mechanical descaling means includes mechanism for bending the rod sharply at a plurality of angles to loosen all scale, and then passing the rod through a rotor provided with brushes and air jets for displacing the loosened scale. Thereafter, and before descaled portions of the rod engage the die, the wire is moved through a magnetic field effective within a chamber filled with a mobile lubricant through which the rod is moved as it approaches the die. The invention also extends to the method of removing residual particles of scale by magnetic means after wire rod has been descaled and substantially cleaned by mechanical means, without pickling or other chemical treatment.

In terms of greater detail, and in particular reference to the arrangement illustrated in the drawings, a strand of rolled wire rod 1 is dispensed from a supply reel or other source (not shown). The rod 1 is fed through an initial descaling station 2, where the rod is directed over a succession of pulleys or rollers 3 of suitable size for causing the rod material to be bent in a plurality of directions at relatively sharp angles, as it progresses. This flexing of the stock rod causes surface scale thereon to be loosened and flaked off from the rod. The size, number and arrangement of pulleys or rollers 3 may be varied to suit the requirements of different manufacturers and different characteristics of the stock material.

From the descaling station 2, the strand 1 is passed through a scale removing station designated in general by the numeral 4. At this station, the strand is passed

axially through an axial opening in a rotor 6 journaled for rotation within a housing 7, suitably mounted upon or in association with the frame of a wire drawing machine. As illustrated, the rotor 6 is driven as an air turbine by means of compressed air supplied from any available source through a supply pipe 10 arranged to direct a jet of air against impeller blades 5 secured to the rotor. Brushes 8 are mounted in carriers 9 radially disposed upon the end of the rotor 6 at which the strand 1 enters the rotor. The brushes 8 are urged along the carriers by springs 11 which press the brushes against the strand with sufficient pressure to displace scale from the surface of the strand as the rotor is rotated. The number of brushes 8 and the pressure applied by the springs 11, may, of course, be varied to suit varying requirements.

The rotor 6 is provided at the end opposite the brushes 8 with jet tubes 12 positioned in enclosed radial relation to the axis of the rotor. The tubes 12 are provided with jet orifices 13 positioned to direct jets of air against the surface of the strand 1 as they emerge from the rotor 6. The air jets issuing from the orifices 13 serve primarily to displace particles of scale which have escaped displacement by the brushes 8. In addition, the jets add impelling impulse tending to rotate the rotor around the strand 1 as it is advanced therethrough.

After leaving the rotor 6, the strand 1 is passed between the poles of a magnet 16 supported upon brackets 17 in axial alignment with the rotor 6. Preferably, the magnet 16 is electrically energized from a suitable source of electrical energy (not shown) through switch controlled conductors 17 operable to connect and disconnect the magnet to the source of energy as required. When energized, the magnetic field attracts scale particles still clinging to the strand 1, and draws them off from the strand and onto the magnet. The electrical characteristics of the magnet may be varied in conventional manner to regulate the strength of the magnetic field and hence the force exerted to displace scale particles from the rod and onto the poles of the magnet, as desired. By periodically breaking the circuit through the magnet, accumulated particles may be released and disposed of in any convenient manner. A permanent magnet may, of course, be substituted in place of the electromagnet, if desired.

As the strand 1 is fed to the first die of the wire drawing machine, it passes through a lubricant chamber designated in general by the numeral 18. The chamber or "soap box" is of conventional construction, and is mounted in association with a die 19 in accordance with conventional practice. An electromagnet, designated in general by the numeral 21, is removably mounted over the chamber in any suitable manner, as by means of trunnions 22 seating upon the upper edges of bracket plates 23 extending above the upper edges of bracket plates 23 extending above the side walls of the chamber. As illustrated, the magnet is provided with poles 24 which extend downwardly into the chamber upon opposite sides of the strand 1 at a point slightly spaced from the die 19. Preferably, the poles 24 have their lower end portions 25 bowed to converge slightly below the strand 1, and shaped to extend downwardly and forwardly at an angle, as best indicated in Figs. 6 and 7 of the drawings. The magnet is energized by electric current from any suitable source through conductors 26 connected in any convenient manner and controlled by a suitable switch 27. A handle 28 is provided upon the magnet 21 by which it may be tilted on the trunnions 22 or lifted bodily from the chamber as desired.

Movement of the strand 1 through lubricant or "soap" contained in the chamber 18 causes the lubricant immediately surrounding the strand to be moved forwardly with it. As the moving strand passes through the die 19, the moving lubricant banks up against the inner face of the die in thin wormlike strands which tumble back and

mix into the bulk of lubricant within the chamber. The bowed and angular shape of the poles aids in directing the flow of lubricant between the poles as it is pulled forwardly with the strand 1, and again as it banks up and levels back within the chamber. Any small particles of scale which may resist the attraction of the magnet 16 are wiped off from the strand 1 by the drag of the lubricant and are exposed to the magnetic field produced between the poles 24, thereby causing the residual particles, if any, to be attracted to and held by the magnet. The chance that any scale particle which may pass the rotor 6 and magnet 16, without being displaced, will also avoid displacement by the lubricant and magnet 21 is so remote as to be negligible. The few particles which may enter the lubricant are caught and held by the magnet poles 24, which may be periodically removed from the chamber to be de-energized and cleaned. While the power and control obtainable by use of an electromagnet is preferred, one or more permanent magnets may be substituted in the lubricant chamber, if desired.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. A rod descaling and cleaning device for wire drawing machines having a die through which wire rod is advanced and provided with a chamber containing lubricant through which the rod passes as it approaches the die comprising a magnet mounted within the chamber in proximity to the rod and die for attracting and holding scale particles carried into the chamber by the rod.

2. A rod descaling and cleaning device for wire drawing machines having a die through which wire rod is advanced and provided with a chamber containing lubricant through which the rod passes as it approaches the die comprising an electromagnet removably mounted within the chamber with its poles spanning the rod at a point near the die.

3. A rod descaling and cleaning device for a wire drawing machine having a die through which wire rod is advanced and a lubricant chamber containing lubricant through which the rod passes as it approaches the die comprising a magnet removably mounted in said chamber, said magnet having a pair of generally vertically disposed pole pieces extending downwardly on opposite sides of said rod at a point near said die, said pole pieces having lower portions thereof extending downwardly and forwardly at an angle towards said die.

4. A rod descaling and cleaning device for a wire drawing machine having a die through which wire rod is advanced and a lubricant chamber containing lubricant through which the rod passes as it approaches the die comprising a magnet removably mounted in said chamber, said magnet having a pair of generally vertically disposed pole pieces extending downwardly on opposite sides of said rod at a point near said die, said pole pieces having lower portions thereof extending downwardly and forwardly at an angle towards said die, said lower portions of said pole pieces being bowed to converge towards each other, whereby the forward ends of said lower pole piece portions are more closely spaced than the rearward ends of said lower pole piece portions.

References Cited in the file of this patent

UNITED STATES PATENTS

1,285,057	Cutter	Nov. 19, 1918
1,905,780	Ahlmann	Apr. 25, 1933
2,059,229	Gregg	Nov. 3, 1936
2,117,651	Caugherty	May 17, 1938
2,199,496	Johnson	May 7, 1940
2,239,044	Leighton	Apr. 22, 1941
2,276,075	Wuensch	Mar. 10, 1942
2,287,663	Brassert	June 23, 1942
2,428,228	Keck	Sept. 30, 1947
2,530,838	Orozco	Nov. 21, 1950

FOREIGN PATENTS

902,876	France	Sept. 14, 1945
---------	--------	----------------