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Barone

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[54] **WIRE DRAWING ANNEALERS**

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[52] **U.S. Cl.**..... **266/3 R,** 219/155, 242/157.1, 242/158 R

[51] **Int. Cl.**..... **C21d 9/62**

[58] **Field of Search**..... 219/155; 339/5 R, 5 L, 339/8 R, 8 L, 111; 242/158 R, 157.1, 54; 266/3 R

[56] **References Cited**

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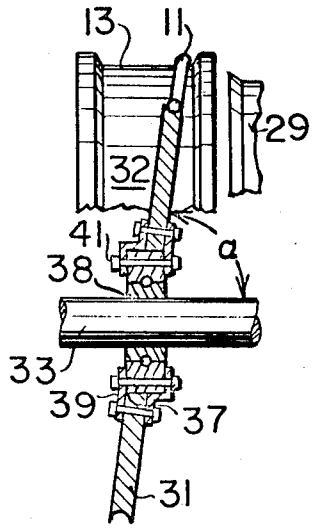
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[57] **ABSTRACT**

In a wire drawing resistance annealer a guide sheave is obliquely mounted on a horizontal axis upstream of the first contact pulley so that essentially all points of the pulley surface are contacted by the wire.

3 Claims, 3 Drawing Figures



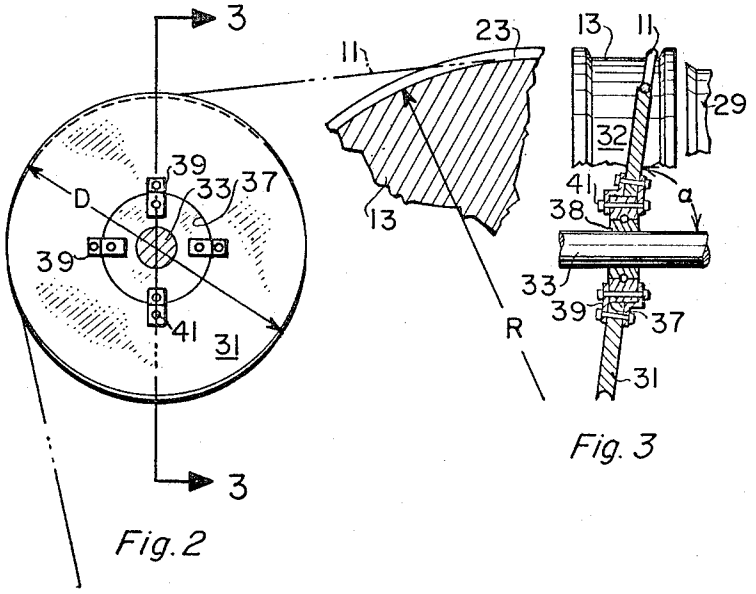


Fig. 2

Fig. 3

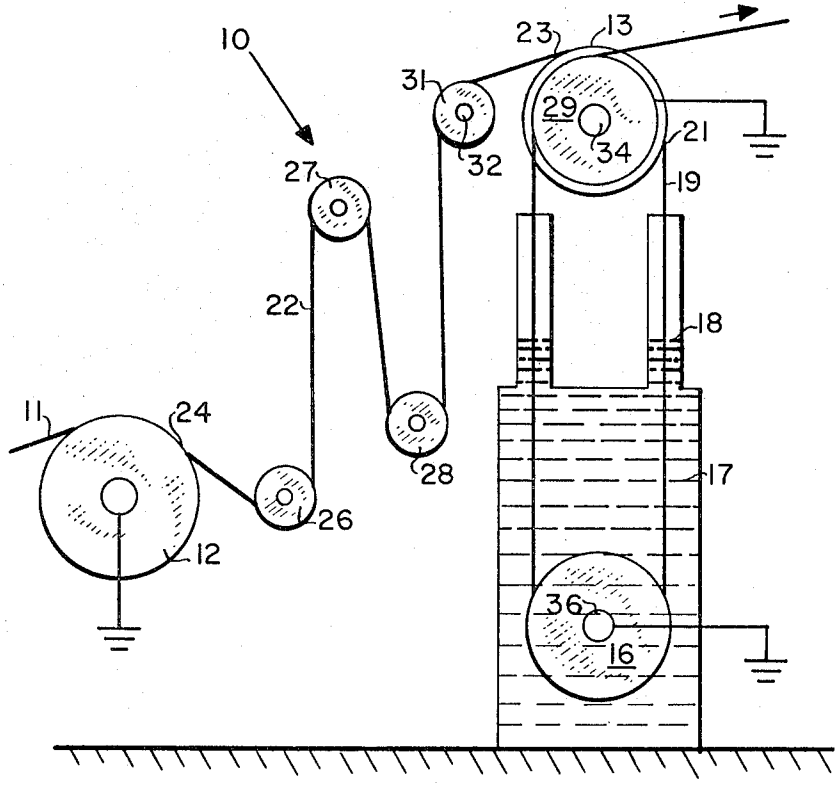


Fig. 1

WIRE DRAWING ANNEALERS

BACKGROUND OF THE INVENTION

In wire drawing machines it has been known continuously to anneal the freshly drawn wire by electrical resistance heating. In apparatus for this purpose the wire emerging from the last die of the wire drawing machine passes consecutively over two contact pulleys between which an electric potential is maintained by means of suitable slip rings and brushes or the like so that an electric current passes through the length of wire that is instantaneously moving between the two pulleys, sufficient to heat the wire to a preselected annealing temperature. Known types of such annealers, however, suffer a defect in that severe sparking occurs between the wire being annealed and one or more of the electrode pulleys. This sparking corrodes and pits the pulley surface with progressively worsening effect, since oxide deposits on the surface of the pulley reduce the contact area and increase the incidence of sparking. This problem is more troublesome for annealing aluminum wire the oxide of which has high electrical resistivity.

It has been known to provide electrode pulleys with broad flat circumferential rim surfaces on which the wire being annealed will ride and make electrical contact with the pulley. This has the advantage that, since a greater pulley contacting surface is available to the moving wire, it takes a long time for the entire surface to become pitted or oxidized. A mechanical traverse with a finger type of wire guide reciprocating across the width of the pulley face has been used to distribute the wire contacting points over the entire surface. Reciprocating traverse mechanisms have, however, failed to operate satisfactorily. This failure is not entirely unexpected since the environment of a wire drawing machine resistance annealer is very severe due to the high temperatures and humidity generated by the water quench which, in usual practice, directly follows the heating cycle.

SUMMARY

The present improvement is directed to a wire drawing annealer having a reliable, trouble free traverse means with a minimum of mechanical parts.

My traverse can be made by inexpensive machining of standard parts, can be readily insulated or mounted on insulators, and is self traversing so that no motor drive is required. In my improvement of apparatus for continuously resistance annealing wire directly downstream of a wire drawing machine comprising first and second contact pulleys mounted on horizontal axes for introducing heating currents into the wire, where the upstream of the pulleys has a contact surface at least several times wider than the diameter of the wire, I have invented the improvement of a guide sheave for the wire mounted directly upstream of the upstream pulley and mounted obliquely on a horizontal axis so that the sheave directs the wire to contact different points across the width of the pulley surface. Preferably the sheave will have a diameter substantially less than the upstream pulley diameter and a circumference that is not integrally divisible into the circumference of the pulley.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 shows a side view of the apparatus of my invention.

FIG. 2 shows an enlarged view including the sheave 31 of FIG. 1.

FIG. 3 shows a section through the lines 3—3, of FIG. 2.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENT

Referring to FIG. 1 an apparatus of my invention indicated generally by the numeral **10** is shown for annealing a wire **11** continuously advancing over a grounded guide pulley **12** from a drawing machine, not shown. An electrode pulley **13**, supplied by a current source, not shown, passes current through the wire to the grounded pulley **12** and a submerged grounded pulley **16**. The pulley **16** is submerged in a cooling water bath **17** having an upper surface **18**. Resistance of a length **19** of the wire **11** between a tangent point **21** on the pulley **13** and the surface **18** is much lower than the resistance of a length **22** of the wire **11** between a tangent point **23** on the pulley **13** and a tangent point **24** on the pulley **12**. This length **22** is deliberately increased by insulated deflecting pulleys **26, 27, 28** to increase the resistance of the length **22**. Because of this difference in the resistance of the lengths **22** and **19**, the former is not annealed but merely preheated while the heavy current passing through the length **19** heats it to annealing temperature. On leaving the pulley **16** the wet annealed wire passes over a pulley **29** coaxial to, but insulated from, the pulley **13**. Thence, the wire passes to take up or processing means, not shown. An essential feature of my invention resides in an insulated sheave **31** upstream of the pulley **13**, shown in more detail in FIGS. **2** and **3**. It is economical to provide insulating properties to the pulleys **26, 27, 28** merely by constructing them of reinforced plastic, ceramic or other nonconducting material and one of the same types of pulleys as the pulleys **26, 27, 28** can be modified for use as the sheave **31**. The simplicity of the necessary modification, which will be explained hereinbelow adds greatly to the value of the present invention. As best seen in FIG. **3**, the pulley has a broad flat contact surface **32**. Typically, for processing wire from 0.016 – 0.040 inches in diameter, the width of the surface **32** will be one-half inch. The sheave **31**, guiding wire onto this surface, is mounted to rotate on an axle **33** having a horizontal axis parallel to the axes of axles **34, 36** mounting the pulleys **13, 16** and **29**. The plane of the sheave **31** is not normal to axle **33**, however, but forms an oblique angle, α, with the axis sufficient that one rotation of the sheave **31** will cause the rim of the sheave to span the width of the surface **32**.

To make my sheave **31** it is sufficient merely to use a commercially available pulley such as the reinforced plastic pulleys **26–28**, remove the existing hub, and drill a hole **37**, at the desired oblique angle to the plane of the pulley for receiving a standard bearing **38** for mounting on the axle **33**. A plurality of bent brackets **39** reinforce the mounting of the sheave **31** upon the ball bearing **38**, but other known reinforcing means may be used within the scope of my invention. Instead of insulating the sheave **31** by forming it of dielectric material other means may be used within the scope of my invention such as forming the axle **33** of nonconducting material, or mounting the axle **33** in insulators.

The sheave **31** is substantially smaller than the pulley **13**, in diameter but its diameter is not integrally divisi-

ble into the diameter of the pulley, i.e., does not form such a simple fraction of the pulley diameter that wire leaving a given point on the sheave will too repeatedly contact the same point on the pulley surface **32**, since the contact tangent point **23** defines the areas of spark generation.

I have made the foregoing description exemplary rather than definitive of my invention for which I desire an award of Letters Patent as defined in the following claims.

I claim:

1. In an apparatus for continuously resistance-annealing wire directly downstream of a wire drawing machine comprising first and second contact pulleys mounted on horizontal axes for introducing heating current into said wire, the upstream of said pulleys having a contact surface at least several times wider than the diameter of said wire, the improvement comprising:

A. a guide sheave for said wire mounted directly upstream of said upstream pulley,

B. said sheave being mounted obliquely on a horizontal axis, thereby directing said wire to contact different points across the width of said surface.

2. The improvement of claim **1** wherein said sheave has a diameter substantially less than the diameter of said upstream pulley.

3. The improvement of claim **2** wherein the circumference of said sheave is not integrally divisible into the circumference of said upstream pulley.

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