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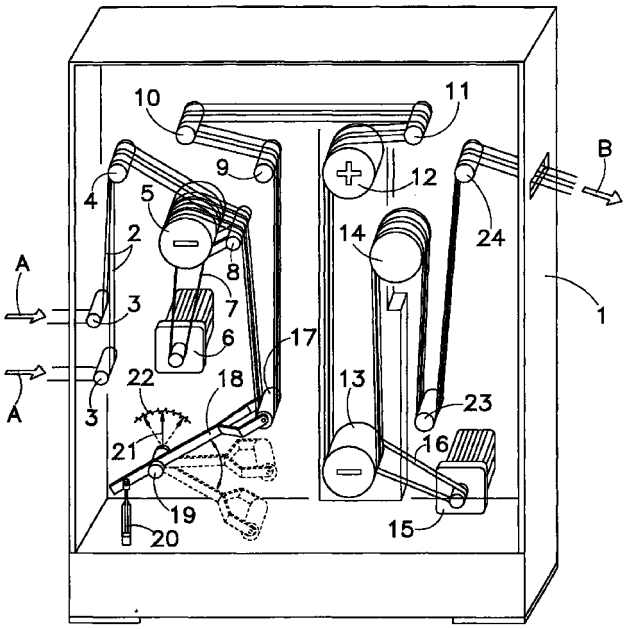
(54) Joule effect continuous annealer for multiple wire drawing machines

(57) A continuous joule effect annealer for multiple wire drawing machines comprises a capstan (5) for the dragging of the wires (2) that is made rotate at a constant speed by a first motor (6) and at least two contact rollers (12-14) that are engaged by said wires (2) and that are kept at an electric potential having alternate polarity with respect to one another and to the capstan. The contact rollers (12-14) are made rotate by a second motor (15) that is independent from the first one (6). Between said capstan (5) and said contact rollers (12-14) an idle roller (17) is interposed that is suitable to detect the degree of tensioning of the wires (2) that are being treated and to operate on a speed governor (21, 22) that is associated with said second motor (15) in order to govern the rotation speed of the contact rollers (12-14) to such a value as to assure a tangential speed of the same rollers equal to the wires' dragging speed (2).



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Description

[0001] The present invention concerns a joule effect continuous annealer for multiple wire drawing machines.

[0002] By the term " annealer" an apparatus is indicated that allows to heat metal wires, in particular made of copper or aluminum, coming out of a drawing machine, up to the temperature that is necessary for the attainment of the normalisation or recrystallization of the metal under treatment, in order to bring the same wires to their natural ductility and to allow their subsequent machinings.

[0003] Joule effect continuous annealers base their operation on the passage of the metal wires under treatment on a dragging winch or capstan first and then on a series of three contact rollers that are made rotate in a synchronous way with the capstan and that are kept, at least the first two, with electric potentials having alternate polarity with reference to one another and with reference to the capstan, in such a way that along the wires that are being transferred from the capstan to the first two rollers and from one to the other of these an electric power flows that is capable to operate their Joule effect annealing.

[0004] Naturally the rollers that operate in contact with the wires thus heated tend to wear out with the consequent need to have to replace them frequently. This determines high maintenance costs for the annealers.

[0005] On the other hand, at the current state it is possible to turn or to grind and then reutilise the rollers that have been removed only once, because the reduction in diameter that results from it determines, at the same speed of rotation of the rollers, a different tangential speed with a consequent burning or breaking of the wires, thus making impossible the reutilisation of the rollers in a convenient way for several times.

[0006] In view of this state of the art object of the present invention has been to realise a continuous joule effect annealer for multiple wire drawing machine that allows to replace, to grind and then to reutilise the same contact rollers several times without any slipping or any other inconveniences to occur in the course of the treatment with the reutilised rollers.

[0007] According to the invention the aforesaid object has been reached with an annealer comprising a capstan for the dragging of the wires that is made rotate at a constant speed by a first motor and at least two contact rollers that are engaged by said wires and that are kept at an electric potential with alternate polarity with respect to one another and to the capstan, characterized in that said contact rollers are made rotate by a second motor that is independent from the first one and between said capstan and said contact rollers a idle roller is interposed that is suitable to detect the degree of tensioning of the wires that are being treated and to operate on a speed governor that is associated with said second motor in order to govern the rotation speed of the contact rollers at such a value as to assure a tangential speed of the same rollers that is equal to the wires' dragging speed.

[0008] In this way, the substitution of the worn out rollers with other ones that have previously been removed and recovered with of turning or grinding operations does not involve problems of any kind, because the jockey roller, by sensing a variation in the tension of the wires, immediately operates a variation in the speed of the second motor and therefore of the contact rollers so as to bring the tangential speed of the contact rollers back to the value corresponding to the wires' dragging speed.

[0009] In this way the contact rollers can be reutilised several times with a consequent reduction in the costs for the maintenance of the annealer .

[0010] The characteristics of the present invention will be made evident by the following detailed description of a possible embodiment thereof, that is illustrated as a non limiting example in the enclosed drawing, that shows the annealer as sectioned according to a vertical median plane.

[0011] The annealer, located at the outlet of a multiple wire drawing machine, that is not shown, comprises an external case 1, heat insulated, in which the metal wires 2 (for instance made of copper or aluminum) enter separately as indicated by the arrows A and they are then deviated by pulleys 3 and 4 toward a dragging winch or capstan 5. The latter is made rotate constant speed by a first electric motor 6 through a belt 7 and in addition it is adequately kept at an negative electric potential (sign"-" marked in the center of the capstan).

[0012] After being wound on the capstan 5 the metal wires 2 are deviated by additional pulleys 8-11 toward a series of three contact rollers 12, 13 and 14 that are made rotate 15 by a second electric motor, independent from the first motor 6, through a system of belts 16. The contact rollers 12 and 13 are adequately kept with electric potential with alternate polarity as regards the one of the capstan 5 (signs "+" and "-" in the drawing).

[0013] In an intermediate position between the pulleys 8 and 9 an idle roller 17 is placed, that is supported in freely revolving way by a tensioning arm 18, that is hinged onto a pin 19 and provided with a tensioning element 20 consisting of a cylinder with adjustable torque or of a counterweight or finally of a spring.

[0014] To the tensioning arm 18 the index 21 of a potentiometer 22 is fixedly mounted, that is possibly replaceable with a position transducer or other similar component capable to determine a voltage value depending on the angle position of the tensioning arm 18.

[0015] The potentiometer 22 or other similar component are associated with the electric motor 15 in order to operate as speed governor for it.

[0016] Finally, two additional pulleys 23 and 24 take

the metal wires 2 out of the annealer , as indicated by the arrow B.

[0017] During operation, the alternate polarity potential that is applied to the capstan 5 and to the contact rollers 12 and 13 determines a flow of power along the wires 2 with the consequent Joule effect heating for the attainment of the desired temperature of normalisation or recrystallization of the metal that composes them.

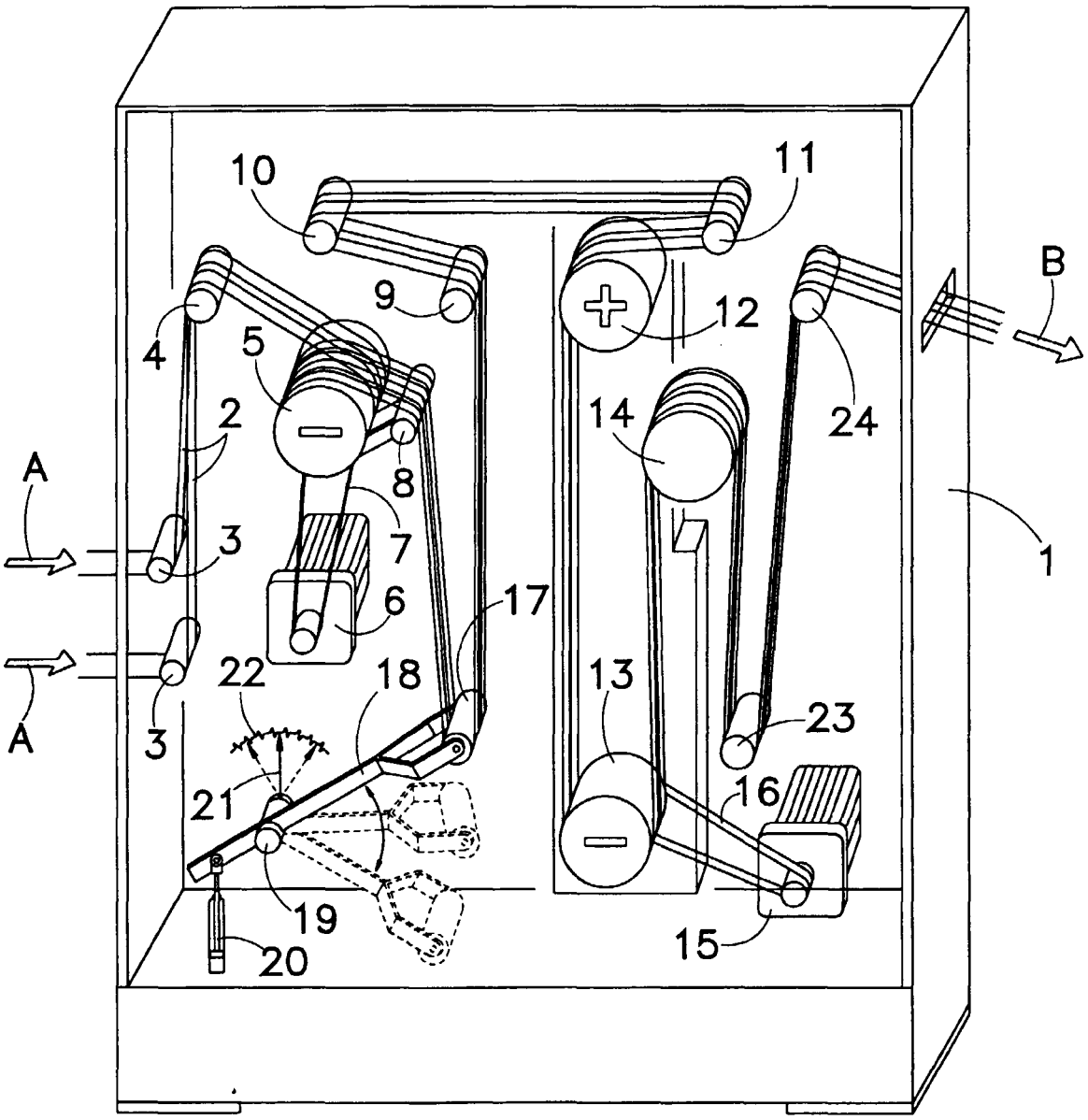
[0018] The progressive wear of the contact rollers 12-14 makes their substitution with new ones necessary. Besides, it will be possible to subject the worn out rollers to turning or grinding operations and then to reutilise them in the annealer . In this case the diameter of the contact rollers that are reutilised will obviously be decreased, therefore with equal angular speed imparted by the motor 15 their tangential speed will correspondingly be decreased. This causes a variation in the tensioning of the wires 2 that is sensed by the tensioning arm 18 with jockey 17, that moves the index 21 of the potentiometer 22 (or other analogous position transducer) correspondingly in a such a way so as to produce a different regulation of the angular speed of the motor 15. More precisely, in this case the angular speed of the motor 15 increases up to bringing the tangential speed of the contact rollers back to the desired value, equal to the one of the capstan 5. The turned or ground contact rollers can thus be reutilised without any slips between wires and rollers or other inconveniences. The maintenance costs of the annealer can therefore be reduced by about 15-20 times as regards the traditional annealers that can not use recovered rollers.

Claims

1. Continuous joule effect annealer for multiple wire drawing machines, comprising a capstan (5) for the dragging of the wires (2) that is made rotate at a constant speed by a first motor (6) and at least two contact rollers (12-14) that are engaged by said wires (2) and that are kept at an electric potential having alternate polarity with respect to one another and to the capstan, characterized in that said contact rollers (12-14) are made rotate by a second motor (15) that is independent from the first one (6) and between said capstan (5) and said contact rollers (12-14) an idle roller (17) is interposed that is suitable to detect the degree of tensioning of the wires (2) that are being treated and to operate on a speed governor (21, 22) that is associated with said second motor (15) in order to govern the rotation speed of the contact rollers (12-14) at such a value as to assure a tangential speed of the same rollers equal to the wires' dragging speed (2).

2. Annealer according to claim 1, characterized in that said idle roller (17) is supported by a tensioning arm (18) provided with tensioning element (20).

3. Annealer according to claim 2, characterized in that said speed governor (21,22) consists of a potentiometer (22) with index (21) that is fixedly mounted to said tensioning arm (18).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