



(11) Publication number : **0 477 147 A1**

(12)

EUROPEAN PATENT APPLICATION

(21) Application number : **91830375.1**

(51) Int. Cl.⁵ : **B21C 43/02, B24B 5/38**

(22) Date of filing : **12.09.91**

(30) Priority : **14.09.90 IT 4828290**

(43) Date of publication of application :
25.03.92 Bulletin 92/13

(84) Designated Contracting States :
AT BE CH DE DK ES FR GB GR LI LU NL SE

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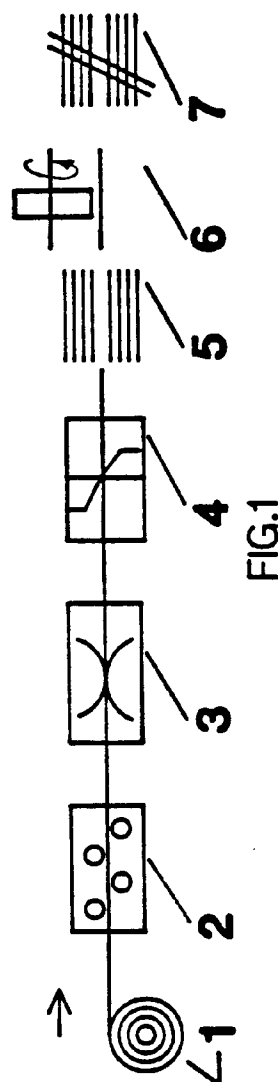
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(54) **Device for continuous grinding of metal bars.**

(57) The traditional drawing device used in the production of drawn ground bars is replaced by a continuous drawing and grinding device consisting of a first die, at least one grinding cutter and a second die.

In this way it is possible to operate with only one treatment line which treats a rough-rolled feed and produces a drawn, ground product which can also be obtained in the form of a long coil instead of short pieces only a few metres in length.

Another advantage is the fact that by appropriate arrangement of the cutters bars of any cross-sectional shape can be obtained.



This invention concerns a device for the continuous grinding of metal bars. More precisely it concerns a device which can perform this operation on products of any cross-section, whether round or polygonal, and of indefinite length.

In pieces subject to fatigue, such as ties, bolts, springs, etc., one of the main requirements is the absence - preferably complete - of surface defects, where cracks may be initiated.

In the production of bars, wire-bars, wires and the like (henceforth referred to as bars), the hot-rolled feed material, in the form of a coil of indefinite length or bars cut to measure, is drawn. In other words it is subjected to plastic deformation, generally cold, which reduces the cross-section to approximately that desired. It is impossible to eliminate surface defects during this operation, but this state of affairs is rectified by grinding which is presently performed by rotating wheels that eliminate the surface layer and bring the product to the desired final shape.

Though this sequence of operations is satisfactory from the aspect of gauge and the elimination of surface defects, it is costly. In fact, since the contact between the grinder and the surface of the workpiece occurs along a straight line, and since there cannot be very many grinders, for obvious reasons of space and cost, the bar must be rotated to ensure that the entire surface is ground.

Hence it is only possible to grind round bars, and these must be of limited length. This not only leads to technical problems during subsequent machining operations, it is also costly because short lengths have to be collected, handled, transported and often even stored.

It is obvious, therefore, that it would be highly desirable to make drawing and grinding one continuous process, which would clearly be beneficial also for downstream processors.

An attempt was made in the past to produce round bars by utilizing several tools with semicircular section arranged to form a circular hole of the desired diameter. However, because of the problem of lining-up the various tools and that of tool wear the finished bars were scored and unsymmetrical, so this approach was abandoned.

The present invention is designed to overcome these drawbacks and to provide a device for the continuous grinding of bars that may even be of indefinite length, and of accepting products of any desired cross-section. According to the invention, on a plant for the production of drawn and ground bars, the drawing machine is replaced by a device consisting of a cage containing a first die, grinding means and a second die arranged along the direction of travel of the bar.

The first die has a hole of the same shape as that of the bar leaving the rolling mill, but with a smaller cross-section. The grinding means proper consist of

at least one cutter which strips a layer of desired thickness from the bar. The second die has a hole whose shape and cross-section are about the same as the required finished bar.

The distance between said grinding means and said dies is preferably between three and five times the diameter of the bar, so that said dies support the latter perfectly in position vis-à-vis the grinding means.

The dies and the grinding means are mounted in a rigid structure or cage, said structure being open between the first die and the grinding means so as to permit the removal of the cuttings, and is closed between the grinding means and the second die, so that a lubricant under pressure can be introduced into the space thus bounded to permit the second die to operate without seizure.

As already indicated, the grinding unit proper consists of at least one cutter. When round bar is being dealt with, the cutter can consist of a metal plate in which there is a sharp-edged hole of the desired diameter, perhaps hardened by surface treatment or plated or covered with hard metallic or ceramic coatings.

If the bar in question has a polygonal cross-section hexagonal for instance - pairs of appropriately-positioned, counterposed cutters set at the desired distance can be employed; a plate with a polygonal hole can also be used.

If there are cutting problems (bar material too hard or too pasty or the like), the layer to be eliminated from the surface of the bar can be removed by successive treatments, by positioning at least two cutting elements with progressively smaller holes, in a sequence along the direction of travel of the bar.

According to the present invention, therefore, the following operations can be performed in a single pass along the line:

- drawing of bar by first die to an intermediate cross-section
- centring of bar on tool by the alignment between the first and second dies
- removal of surface layer of bar (affected by defects and/or decarburization, etc.)
- reduction to the precise final dimension required, by means of the second die.

The present invention will now be described in greater detail by reference to an embodiment illustrated purely by way of example and in no way limiting in the accompanying diagrams where:

- Fig.1 represents a general layout of the drawing and grinding installation according to the known technique
- Fig.2 represents a schematic sectional view of the drawing and grinding device as per the present invention.

According to the Fig.1 set-up a coiled bar is straightened in straightener 2, drawn in 3, cut into

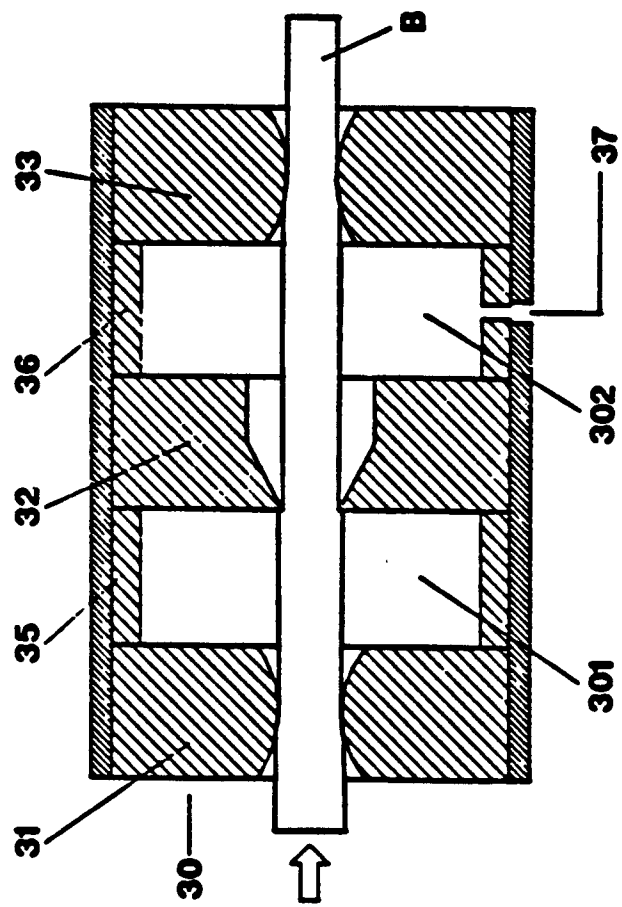
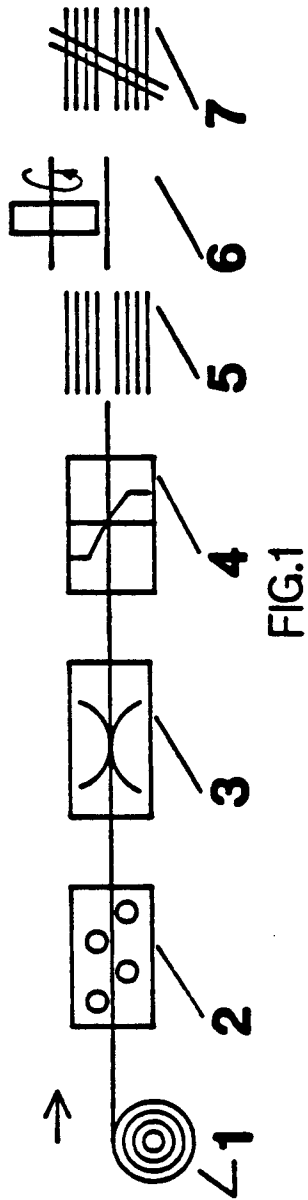
lengths 4, which are stored in 5, and then are ground one by one in plant 6 and made up into bundles 7.

Fig.2 provides a schematic sectional view of the drawing and grinding device as per the invention, which consists of a cage 30 carrying a first die 31, a cutter 32 maintained at the desired distance from the first die by a distance-piece 35, and a second die 33, separated from the cutter by a distance-piece 36. The hot-rolled bar B, which travels in the direction indicated by the arrow, is centred vis-à-vis the cutter 32 by dies 31 and 33, and is drawn in 31, ground by cutter 32 and reduced to the final desired size by die 33. Cage 30 is divided into two parts with dies and cutter in the first part 301, which has open sides to facilitate removal of cuttings produced by cutter 32, and a second part 302, which is closed so it can be filled through pipe 37, preferably by lubricant under pressure in order to reduce friction between bar and die, thus favouring gauging.

A prototype device as per the invention has permitted the continuous treatment of 4000 kg of bar without any stoppages or other drawbacks and with final surface tolerances and quality completely within specification.

Claims

1. Device for the continuous grinding of hot-rolled bars, wire-bars, wire and the like, characterized by the fact that it consists of a cage containing a first die having a hole the same shape as that of the hot-rolled bar but a smaller cross-section, grinding means and a second die having a hole the same shape and cross-section as the desired finished bar, all arranged along the direction of travel of the bar.
2. Device for grinding bar, wire-bar, wire and the like as per Claim 1, characterized by the fact that said grinding means consist of at least one cutter.





European Patent
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EUROPEAN SEARCH REPORT

Application Number

EP 91 83 0375

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	FR-A-2 237 692 (LA SALLE STEEL COMPANY) * the whole document *	1, 2	B21C43/02 B24B5/38
A	FR-A-2 300 655 (SOCIETE METALLURGIQUE DE REVIGNY) * page 1, line 1 - line 24; figures *	1	
A	DE-A-3 602 672 (NPSP) * claim 1; figures *	1	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			B21C B24B
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 19 DECEMBER 1991	Examiner ESCHBACH D.P.M.
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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