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(54) **Automatic rolling machine with flat chasers**

(57) An automatic rolling machine (1) with flat chasers, comprising a stationary plate (33) and a moving plate (3) having a reciprocating motion; a blank is arranged

between the plates and is made to roll under pressure in order to form a thread, the moving plate is mounted on a slide (4) actuated by one or more linear motors (11).

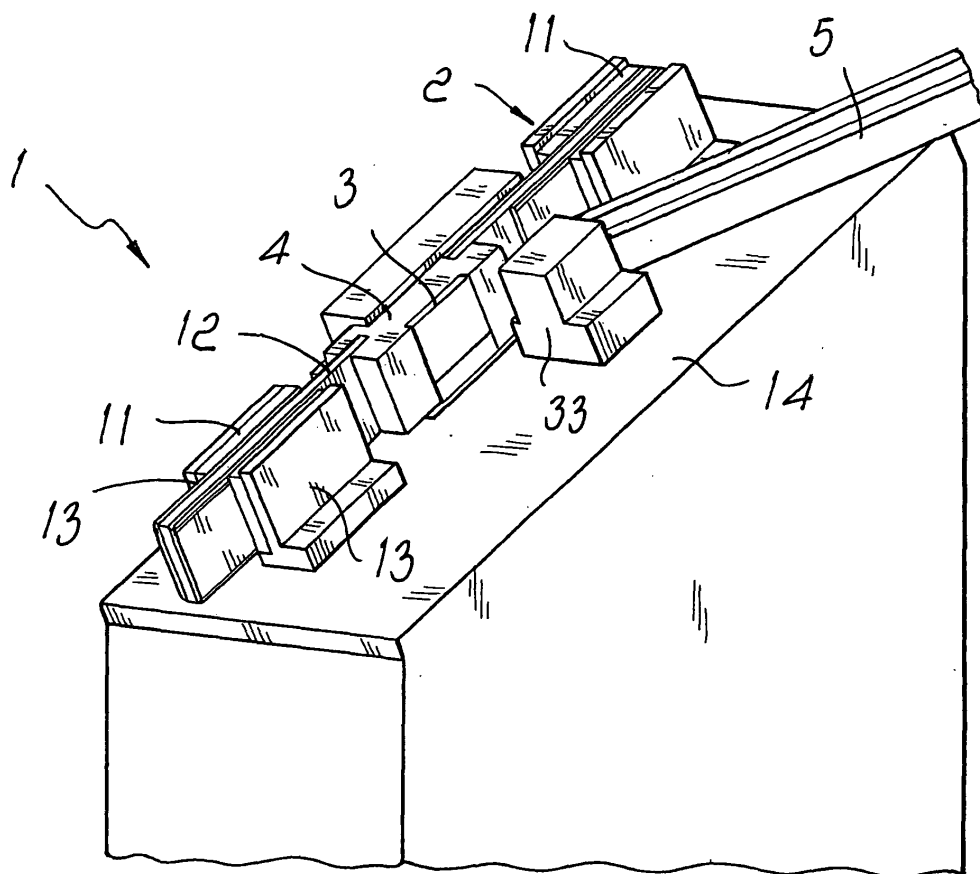


Fig. 1

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Description

[0001] The present invention relates to an automatic rolling machine with flat chasers.

[0002] As it is known, rolling machines of the so-called flat chaser type can be used to produce screws, bolts and rotational parts in general.

[0003] In this type of machine, the blank is machined by the combined action of compression and consequent rolling of the part to be machined between two tools that are substantially shaped like a plate and are provided with one or more profiles in relief.

[0004] In particular, by virtue of the relative motion of the two tools, which are commonly known as rolling racks or chasers, it is possible to turn the blank, gradually imparting thereto in depth the profile of the tools.

[0005] The relative motion of the tools, which is generally performed by keeping one tool stationary and by moving the other one with a reciprocating motion, is provided by a rod-and-crank system, which is per se known and in which the crank, which actuates the reciprocating motion of the moving tool, is actuated by a spindle.

[0006] In order to ensure a certain uniformity of the reciprocating motion determined by the rod-and-crank system, flywheel masses are connected to the crank and are located diametrically opposite the crank with respect to the spindle, so as to keep its motion uniform by virtue of their strong rotational inertia.

[0007] The aim of the present invention is to provide an automatic rolling machine with flat chasers that is improved with respect to currently available machines.

[0008] An object of the invention is to provide a rolling machine that allows the possibility of modular manufacture of all the mechanical parts, so as to facilitate their best execution on medium and small machine tools, at the same time ensuring an excellent quality level of the parts.

[0009] Another object of the invention is to provide a machine in which it is possible to monitor the production cycle of each individual manufactured part, so as to ensure the perfect quality of the entire batch of manufactured items.

[0010] Another object is to provide a machine whose geometry allows, by virtue of the freedom to axially fix the top and bottom dead centers, to practically obtain configurations of rolling machines of different sizes on a single model.

[0011] Another object is to provide a rolling machine that is completely free from flywheel masses, so as to allow to set different kinematic rules for the work stroke and for the return stroke, to the full benefit of greater uniformity of the deformation process and of higher productivity, determined by the higher speed that can be achieved during the idle return step.

[0012] Another object of the invention is to provide a machine that is constructively simplified and whose drastic reduction in electronic and mechanical components leads to easier production planning and to a reduced like-

lihood of technical failures.

[0013] This aim and these and other objects, which will become better apparent hereinafter, are achieved by an automatic rolling machine with flat chasers, characterized in that it comprises a stationary plate and a moving plate provided with a reciprocating motion, between which a blank is arranged and is made to roll under pressure in order to form a thread, characterized in that the moving plate is mounted on a slide which is actuated by one or more linear motors.

[0014] Further characteristics and advantages of the invention will become better apparent from the following detailed description of preferred but not exclusive embodiments thereof, illustrated by way of non-limiting example in the accompanying drawings, wherein:

Figure 1 is a perspective view of the automatic rolling machine with flat chasers according to the invention; Figure 2 is an enlarged-scale perspective detail view of one of the linear motors.

[0015] With reference to the cited figures, a rolling machine according to the invention, generally designated by the reference numeral 1, comprises a stationary plate 33 and a moving plate 3, having a reciprocating motion.

[0016] A blank, which arrives from a feeder guide 5, is placed by an insertion device between the two plates 3 and 33. The two plates roll the blank under pressure.

[0017] The plates have protrusions that are inclined at an angle that matches the pitch of the thread, thus constituting a female thread projected onto a plane, and by pressing the material they force it to assume the shape of the thread.

[0018] The moving plate 3 is mounted on a slide 4, which is actuated, according to the invention, by one or more linear motors 11.

[0019] For this purpose, the slide 4 is rigidly coupled to the part termed rotor, designated by the reference numeral 12, of each linear motor.

[0020] Each linear motor has a stator part 13, which is rigidly coupled to a base 14 of the rolling machine.

[0021] In practice it has been found that the invention achieves the intended aim and objects, providing an automatic rolling machine with flat chasers which employs a linear motor for actuating the main slide, which until now was actuated by the conventional rod-and-crank mechanism or at the most with a torque motor coupled directly to the small end of the rod.

[0022] The unrivaled performance of linear motors in terms of dynamics and precision in positioning is in fact an important advantage of the present rolling machine which is more flexible, faster and more reliable.

[0023] The automatic rolling machine according to the present invention has several absolutely innovative aspects, which are listed hereafter.

[0024] The modular construction of all the mechanical parts facilitates the best execution on small and medium-sized rolling machine tools, ensuring at the same time

their excellent quality level.

[0025] The simplification, or even complete elimination, of the kinematic chain allows to provide an energy efficiency improved by a two-digit percentage with respect to conventional solutions.

[0026] In view of the direct thrust of the linear motors, it is possible to monitor the production cycle of each individual manufactured part by current-based control, so as to ensure the perfect quality of the entire batch of manufactured parts.

[0027] The geometry of the rolling machine thus designed allows, by virtue of the freedom to fix axially the top and bottom dead center, to practically obtain configurations of rolling machines of different sizes on a single model without any mechanical complication or burden.

[0028] The absence of flywheel masses allows to set different kinematic rules for the work stroke and for the return stroke, to the full benefit of greater uniformity of the deformation process and of higher productivity, afforded by the higher speed that can be achieved during the idle return step.

[0029] The traditional adjustments regarding the placement of the top dead center according to the tool being used, normally performed by means of manual adjustments on an eccentric element of a rod or, in a more modern fashion, by means of a servo-controlled mechanism, with toggle locking and release, which is the subject of a patent of this same Applicant, can be performed here from an operator panel simply by entering the level of the top dead center.

[0030] Repeatability is therefore on the order of hundredths of a millimeter.

[0031] The drastic reduction of the mechanical and electronic components leads to easier production planning and to reduced likelihood of technical faults.

[0032] The use of actuation with linear motors allows to increase the operating speed of the machine, provides complete flexibility and eliminates mechanical wear completely, increasing the reliability of the system.

[0033] This application claims the priority of Italian Patent Application No. MI2006A000800, filed on April 21, 2006, the subject matter of which is incorporated herein by reference.

Claims

1. An automatic rolling machine with flat chasers, **characterized in that** it comprises a stationary plate and a moving plate having a reciprocating motion, a blank being arranged between said plates and being made to roll under pressure in order to form a thread, **characterized in that** the moving plate is mounted on a slide which is actuated by one or more linear motors.
2. The rolling machine according to claim 1, **characterized in that** said slide is fastened to the rotor part of each linear motor.

3. The rolling machine according to claim 1 or 2, **characterized in that** each linear motor comprises a stator element fastened to the base of the machine.

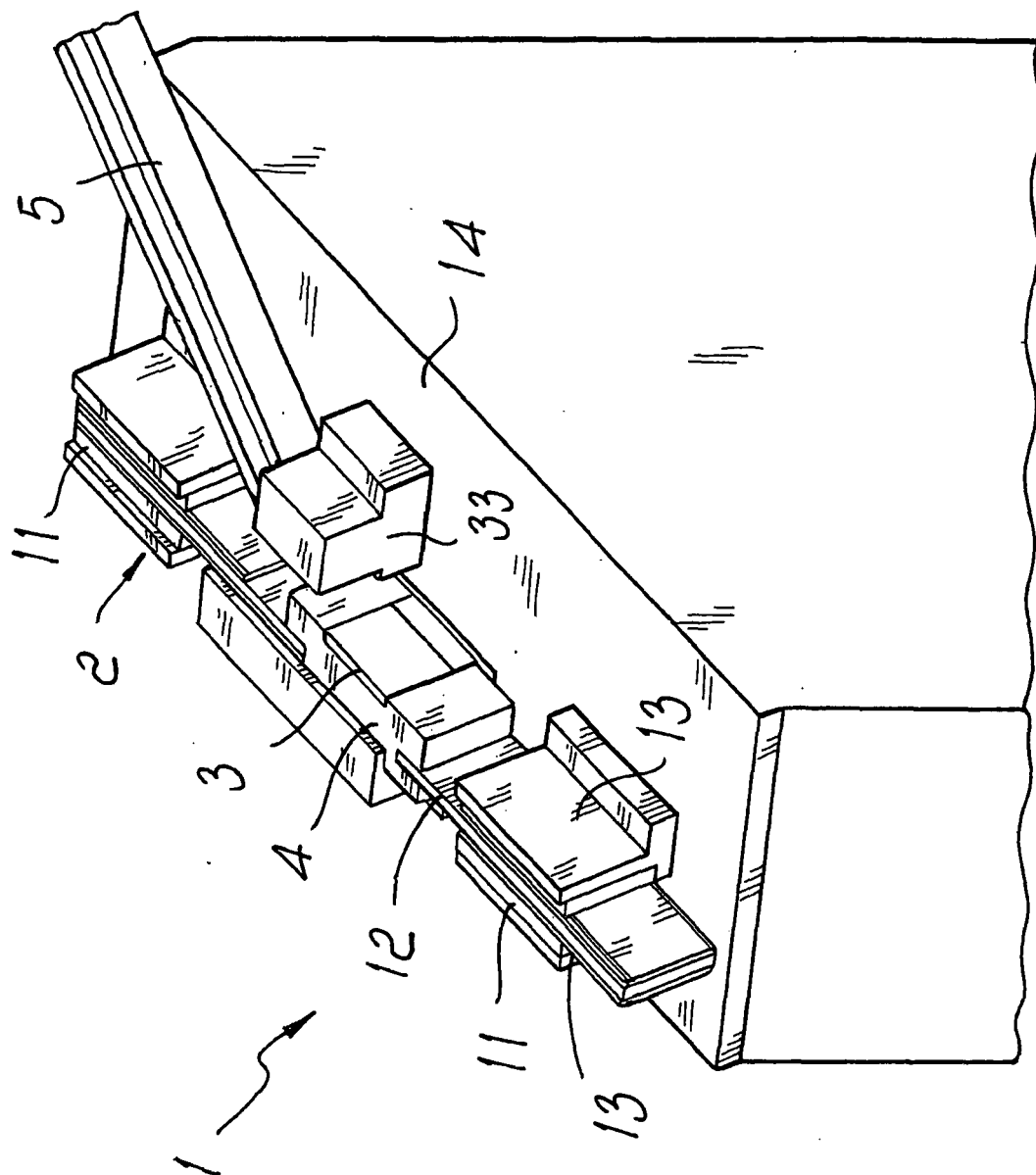


Fig. 1

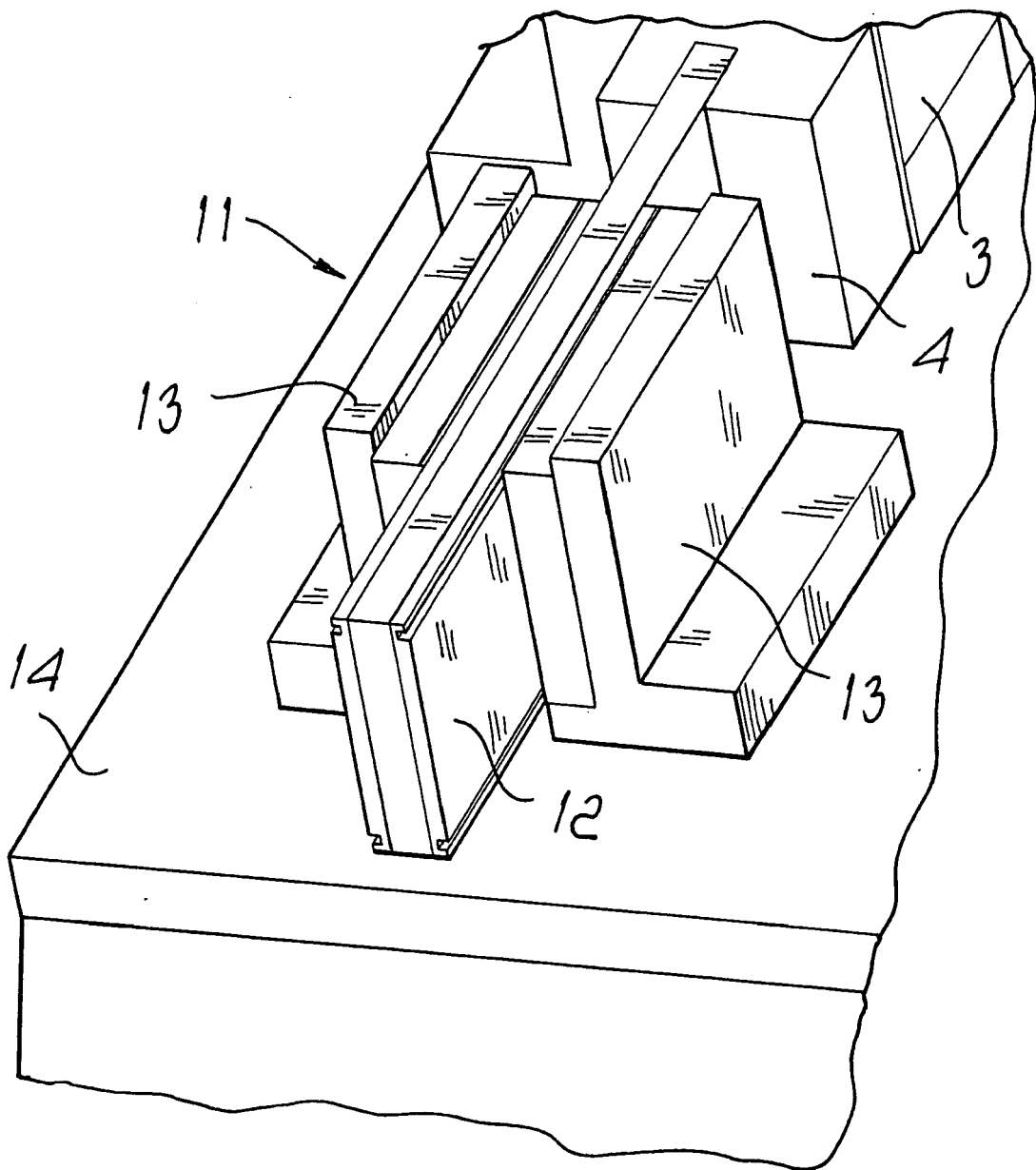


Fig. 2



European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 07 00 7577

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Place of search The Hague		Date of completion of the search 20 July 2007	Examiner SERGIO DE JESUS, E
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**ANNEX TO THE EUROPEAN SEARCH REPORT
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