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(54) **BAND SAW BLADE**

(57) The invention deals with a band saw blade having on its whole length teeth with the same shape and wherein each tooth has a groove (d) machined in the tooth chest, the groove having a length (l) and a width (b), wherein the length (l) of the groove d is between 8-9 mm, and the width b is between 2-3 mm, the tooth shape being determined by the rate between the teeth height (h) and their pitch, the blade presenting on its whole length repetitive sequences of teeth having different pitch lenghts, the said sequences including 4 or 6 teeth, and wherein the pitch magnitude first progressively increases and then decreases.

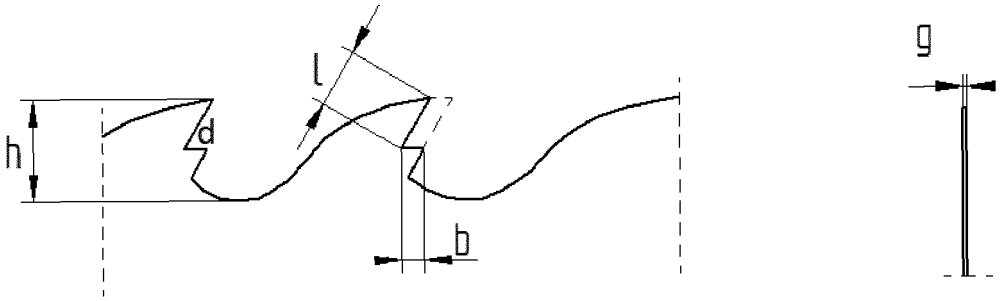

Fig. 1

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Description

[0001] The present invention relates to a band saw blade according to the appended claims, intended for high-speed cuts and high durability.

[0002] Increasing the cutting time between two sharpenings is the main users' requirement, in particular where performant machines are used.

[0003] From the WO 9629173 document it is known a variable pitch saw blade, including groups of teeth, each group having a straight tooth (brake) and a lot of setted teeth (lateral). Each tooth has a cutting edge arranged in a predetermined cutting plan and one pitch between it and the next saw tooth, the cutting edge being coplanar with the mentioned predetermined plan. The size of the area of each tooth is directly proportional to the pitch of that tooth, such that the size of the teeth surfaces is the same for all the teeth having the same pitch.

[0004] A technical solution disclosed in the US 4179967 document refers to a saw blade provided with an arrangement and a form of teeth that reduces vibrations, and cutting noise, and improves the cutting speed and the lifetime of the blade. The teeth are arranged in recurrent groups wherein they alternately decrease and grow, with the teeth tips in an aligned and laterally established position, so that smaller teeth are offered a positive cutting angle that increases while the teeth dimensions decrease, and the angle of attack of the smaller teeth is sharper, causing them to penetrate and remove a larger piece of wood, thus the tendency to equalize the size of the chips removed by the different teeth.

[0005] The capability to generate, using the computer, higher complexity curved surfaces, intended, for example, to be used in the architectural, aeronautical, wind mills, naval and any other field involving the use of large area curved surfaces (e.g., skateboarding tracks, swimming pools, solar collectors, etc.). The ultimate goal is to increase efficiency or/and reduce production costs.

[0006] The technical problem solved by the present invention is to increase the cutting time between two sharpenings and obtaining a high cutting speed for very high performance machines.

[0007] This object is achieved by the band saw blade covered by the independent claim 1.

[0008] In a preferred manner, the band saw blade according to the present invention has throughout its length, teeth having the same profile and each tooth has a groove, machined in the tooth chest, the said groove being between 8-9 mm long, and 2-3 mm wide, the saw blade presenting repetitive teeth sequences with varying pitches, the repetitive sequences being of 4 or 6 teeth and the magnitude of the pitch first increasing progressively and then decreasing.

[0009] Advantages of using the new band saw blade:

- in the long term, the cost of cutting is lower
- no cracks occur due to maintenance
- the cutting productivity increases significantly
- it eases the work of the operator
- the timber average cutting is higher by at least 10% as compared to using another blade
- the cutting speed is significantly increased
- long cutting period between 2 sharpenings
- easier maintenance of the blades
- improves the performance of old equipment
- it enables full use of the equipment performance - achieving its maximum thruput
- lower energy consumption (current - A)
- higher quality cut: straight cut, smoother surface of the wood cut, good saw dust discharge.

[0010] In the following, an embodiment of the invention is given, in relation to Figures 1-5, representing:

Fig 1 the tooth shape;
Fig 2 detail of the repetitive sequences of teeth, having a varying pitch magnitude (variable pitch);
Fig 3 blade with the repetitive sequences of teeth;
Fig 4 the level of internal strains in the saw blade in the case of an usual tensioning;
Fig 5 the level of internal strains in the saw blade in the case of an LTC tensioning.

[0011] The band saw blade according to the present invention has identical teeth that have a special shape, which is given by a groove machined in the tooth chest. According to fig. 1, a tooth has a groove **(d),** having the length **(l),** and the width (b). In the present invention, the length **(l)** of the groove may be between 8-9 mm and the width b between 2-3 mm.

[0012] This particular shape consists in the rate between the height **(h)** and the pitch of the teeth which is higher than in the case of conventional blades, and enables a larger volume of chips to be incorporated and discharged.

$$h = (9\text{-}11) \times g$$

where:

h - the tooth height
g - the thickness of the saw blade

[0013] The saw blade according to the invention, wherein the teeth have a groove **(d),** having the same shape, exhibits repetitive sequences of teeth with different pitch magnitude. On a variable pitch saw blade, repetitive sequences of 4 or 6 teeth are formed, wherein the pitch magnitude progressively, first increases and then decreases.

$$P1 = p - \Delta p$$

$$P2 = p - 2 x\Delta p$$

$$P3 = p - \Delta p$$

$$P4 = p$$

where:

p - the reference pitch
P1..P4 - variable pitch
Δp - pitch increment
Svar- a sequence of variable pitches
n - number of sequences
L - the length of the blade

[0014] Such sequences are repeated along the blade (see Fig. 3). The different magnitudes of the pitches has the effect of producing chips with different thicknesses and repeating them periodically will produce oscillations having different amplitudes and frequencies, and their overlap reduces the blade vibrations during cutting, thus allowing increased feed rates and resulting in a superior quality of the wood cut surface.

[0015] Superior performance achieved due to the optimal combination of the constructive elements:

1. Special tooth profile in terms of its shape and sizes.
2. Repetitive sequences of teeth having different pitch magnitudes (variable pitch).
3. Particular LTC (long time cutting) tensioning of the blade providing an extended cutting period.

[0016] The level of the internal stress occurring in the saw blade having a particular shape and variable pitch is illustrated in Fig. 5, as compared to the conventional stress, in Fig. 4.

[0017] The difference is that, under LTC tensioning, two "0" stress strips are left, the first at the distance "l1" from the gullet and the other at the distance "l2" relative to the tooth void resulting, on one hand, in a better setting of the blade on the wheel, thus an improved cutting stability, allowing the use of increased feed rates and, on the other hand, the "T1" pre-tensioning on the two edges resulting from the tensioning on the bandsaw results in reduced stress within the material in that area reducing thus the danger of cracking during a longer use.

[0018] The special shape results in crushing the chip and provides for an easier removal of the sawdust, resulting in lower cutting forces and allowing higher feed rates per tooth and consequently higher cutting speeds.

[0019] The shape is intended to reduce the vibrations in the cutting process, through the fact that the teeth are cutting at different time intervals and at different feeds per tooth, thus avoiding the blade entering into resonance. Reduced vibrations enable higher blade speed leading to higher cutting yield (higher cutting speed).

[0020] The smooth, vibrations free cutting reduces the stress within the blade and drastically decreases fatigue, the main loading that reduces the durability of the blades between two sharpenings.

[0021] Another factor that increases the durability of the blade is the LTC tensioning mode.

[0022] Also, the reduced vibrations have a positive influence on the precision and the quality of the wood surface cut.

[0023] The present invention has been described above only for example. It is understood that a qualified person is able to carry out different embodiments of the invention without thereby leaving the patent framework, as it is defined by the claims.

Claims

1. Band saw blade **characterized in that** on the whole length of the blade it presents teeth having the same shape and wherein each tooth has a groove **(d)** machined in the tooth chest, the groove having a length **(l)** and a width **(b),** wherein the length **(l)** of the groove **(d)** is between 8-9 mm, and the width **(b)** is between 2-3 mm, the tooth shape being determined by the rate between the teeth height **(h)** and their pitch, the blade presenting on its whole length repetitive sequences of teeth having different pitch magnitudes, the said sequences including 4 or 6 teeth, and wherein the pitch lenghts first progressively increases and then decreases.

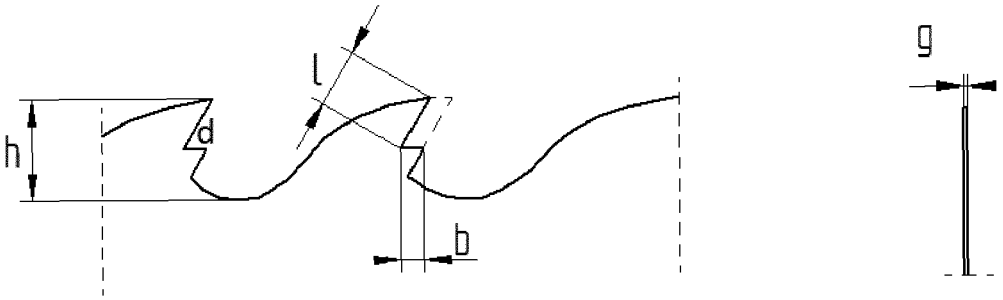

Fig. 1

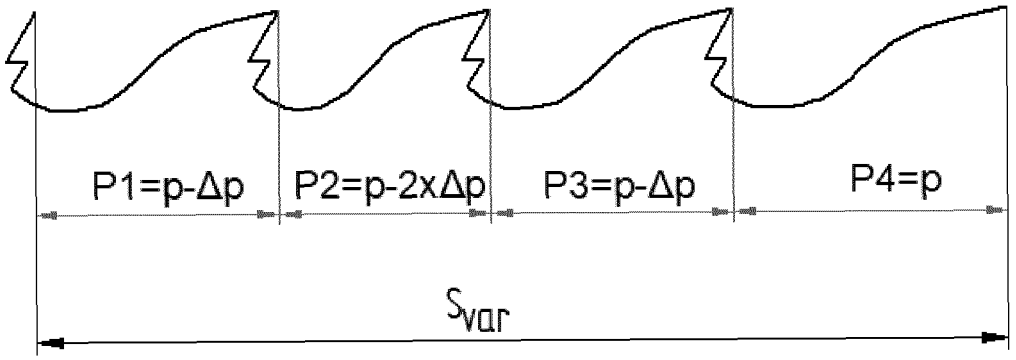

Fig. 2

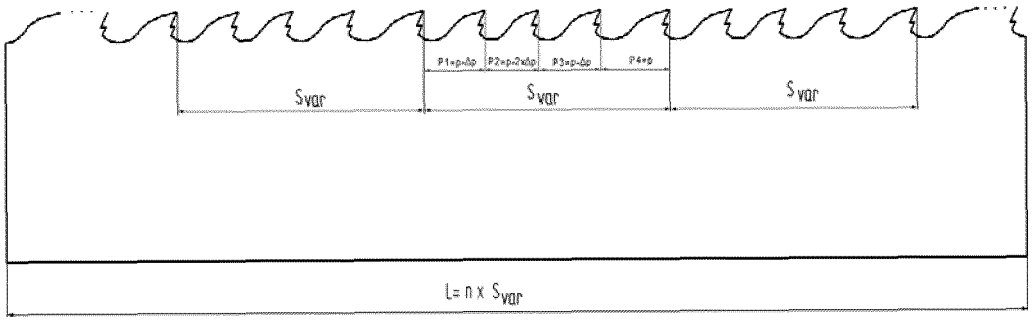

Fig. 3

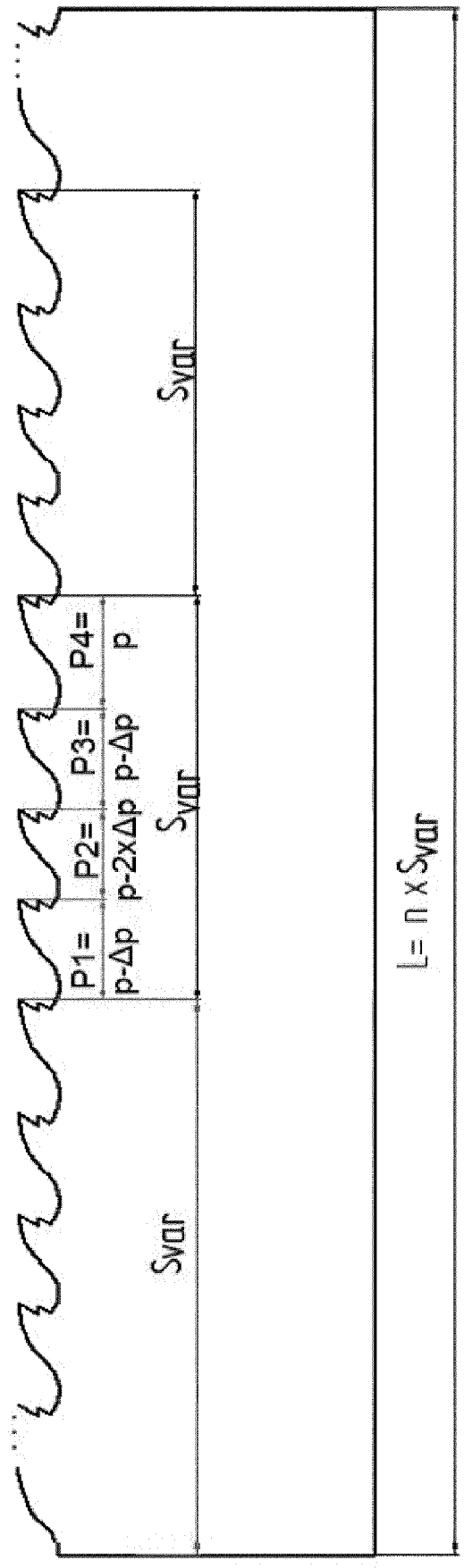

Fig. 3

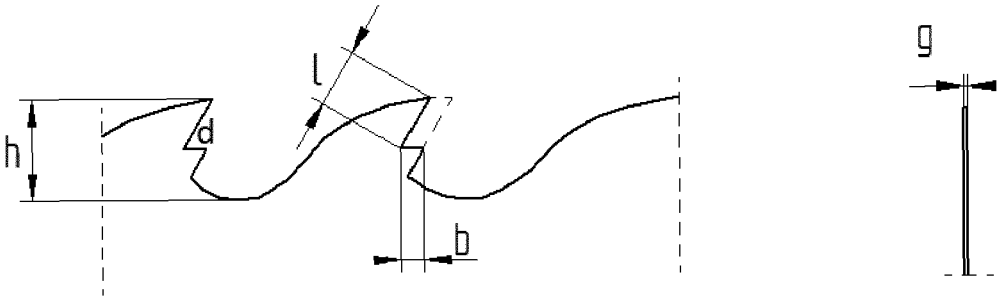

Fig. 1

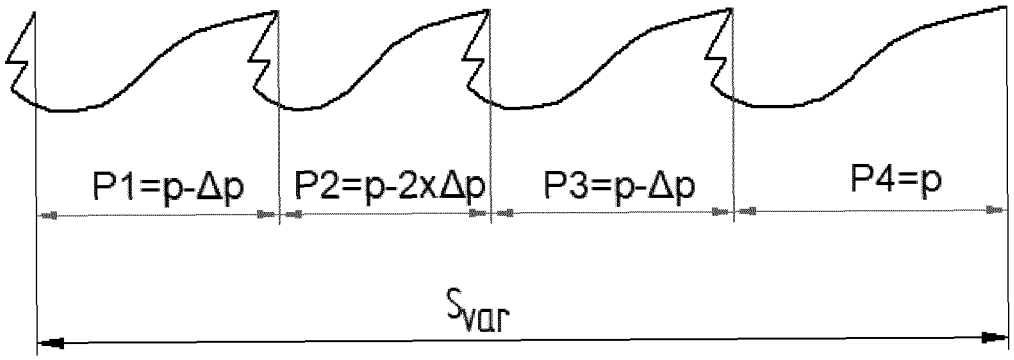

Fig. 2

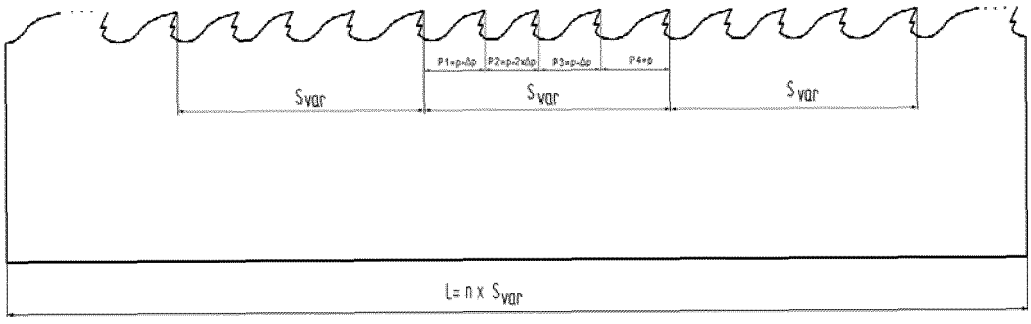

Fig. 3

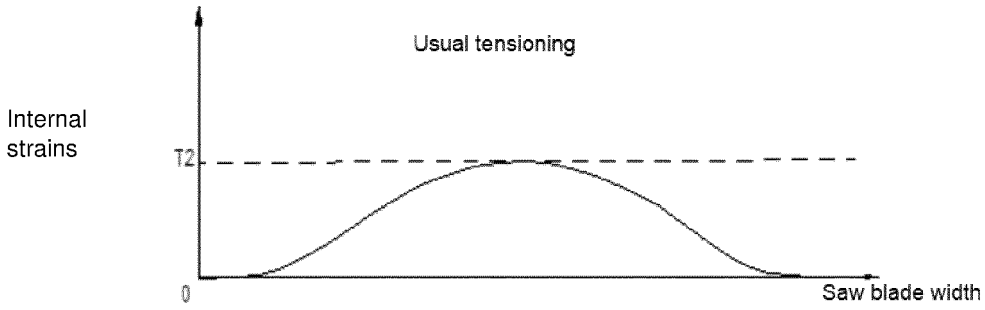

Fig. 4

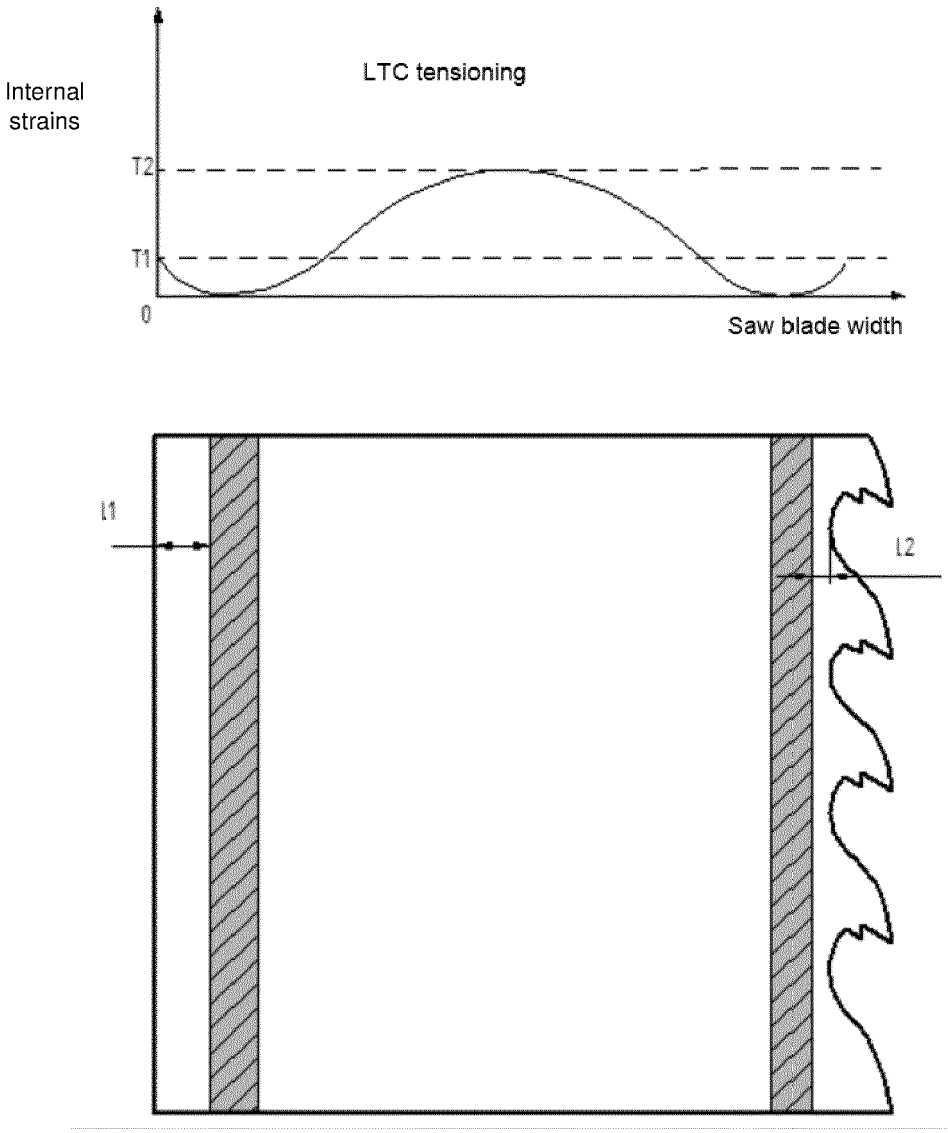
Internal strains
LTC tensioning
T2
T1
0
Saw blade width
l1
l2

Fig. 5

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EUROPEAN SEARCH REPORT

Application Number
EP 21 18 4433

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
Y	EP 2 319 647 A1 (AMADA CO LTD [JP]; AMADA MACHINE TOOLS COMPANY LTD [JP]) 11 May 2011 (2011-05-11) * paragraph [0102] * * figures 9(a),9(d) *	1	INV. B23D61/12
Y	WO 2020/041816 A1 (LEITINGER HANS PETER [AT]) 5 March 2020 (2020-03-05) * page 7, paragraph 2 * * figure 2 *	1	

TECHNICAL FIELDS SEARCHED (IPC)
B23D

1 The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	16 December 2021	Rijks, Mark

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16-12-2021

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- US 4179967 A **[0004]**