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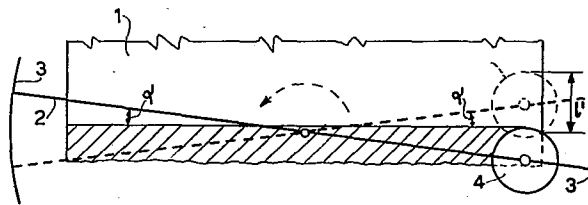
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⑤④ **Continuous smoothing machine with conveying tape for solid surfaces, particularly adapted for slabs of stony material.**

⑤⑦ It is a continuous smoothing machine, which has a device able to allow the abrasive or finishing plates 4 to go through a path inclined of a $90^\circ + \alpha$ angle during the going run and of a $270^\circ - \alpha$ angle during the return run, with respect to the longitudinal axis of a conveying tape with continuous motion for the slab 1 to be worked, α being a prefixed angle chosen in such a way as to allow a plate working path substantially perpendicular to the direction of advancement of the tape.



"Continuous smoothing machine with conveying tape for solid surfaces, particularly adapted for slabs of stony material".

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5 The present invention relates to a machine for roughing, smoothing and finishing solid surfaces, particularly adapted for stony materials.

10 As known, roughing or gaugering, smoothing and finishing are the last stages of working of stony materials and are carried out by means of horizontal circular plates driven to rotary motion and provided with abrading or finishing materials of several kinds on the lower faces.

15 About twelve years ago, there appeared on the market the tape type smoothing machines, also called "continuous lines", in which abrading and finishing plates simultaneously driven to rotary motion and to alternating translatory motion perpendicular to the continuous motion of the tape act simultaneously on horizontal slabs.

20 Due to their rate of production, these machines have had a wide and deserved diffusion and, even if different from each other in the several models, have basically won the market of the stony industry.

25 We now analyze the operation of any known abrasive plate, by considering Fig. 1, wherein we have designated with V_N the speed vector of the tape, caused to advance in the direction of its longitudinal axis, and therefore of the superimposed slab, with 1 the moving slab having width L, with 2 a stationary transversal bridge which rests on bases 3 and further represents the path of the plate 4 with speed vector V_M .

30 In Fig. 2 we have indicated by hatching the slab zone already worked by the plate 4, which, having ended the going run A-B, is

going to start again for the return run B-C. The virgin area worked by the plate during any run, V_N , V_M and L remaining constant, will be an isosceles triangle with height L , base $A-C = 2 \tan \angle \cdot L$ and vertex angle $= 2 \angle$, caused by the vectorial composition of V_N and V_M ; it is obtained $\sin \angle = \frac{V_N}{V_M}$.

This fact will appear clearer if we imagine the tape stationary and the transversal bridge in motion towards the top part of the drawing. The work of the plate during its running of the length B-C with its higher edge and at speed V_M will be constituted by removal of a given thickness of material with a width ℓ which varies from 0 at point B to a maximum value $\ell'_{\max} = A-C = 2 \tan \angle \cdot L$.

Its average value will therefore be equal to $\frac{\ell'_{\max}}{2}$ and, since the tape speed V_N and consequently $\angle$ and consequently $\ell'_{\max}$ have been chosen in such a way that the tool resists the maximum, even if momentaneous, stress at the end of each run, we should conclude that we exploit a half part of the possibilities of the plate.

We add that in these conditions of employment we can never have a constant optimal pressure due to the continuous change of the new surface to be worked and, similarly, we can never have a constant optimal amount of cooling and washing water, due to the continuous change of the volume of removed material.

The object of the present invention is to realize a machine which adds to the favourable features of the present smoothing machines of tape type that of exploiting almost the 100% of the maximum capacity of the tool.

According to the invention such an object is reached by a tape-type smoothing machine, of which we have schematically indi

cated in Fig. 3 one of the several abrasive groups of the same smoothing machine, which group differs from that of Fig. 1 as to the fact that the transversal bridge 2 rests on semicircular guides 3, which allow it to rotate through a same angle α both in clockwise and anticlockwise sense.

In Figs. 4 to 7 there are indicated the successive positions of the horizontal plate 4 and of the transversal bridge 2 with its inclination α with respect to the motion of the conveying tape, that is of the slab 1.

As already said, the representation is limited to one abrasive group, even if their number in a smoothing machine really varies from 4 to 13.

In Fig. 3 the plate 4 is in starting position with the bridge 2 inclined of α . As α has been calculated previously according to the speed V_N of the conveying tape and the translation speed V_M of the plate 4 is also known, at the end of the going run the plate (see Fig. 4) will have worked a horizontal strip which has been indicated by right-hand inclined hatching.

In Fig. 5 the bridge is shown in continuous line before the 2α anticlockwise rotation and then in dashed line in the position suitable to allow the plate to start the return run. At the end of the return run the plate (see Fig. 6) will have worked a horizontal strip which has been indicated by left-hand inclined hatching.

Fig. 7 is merely the repetition, however with clockwise rotation, of the movement illustrated in Fig. 5 for putting the plate in the starting position of Fig. 3 and therefore repeating the operating cycle.

It should be noted that the anticlockwise and clockwise rotations of the bridge 2 as shown in Figs. 5 and 7 allow the plate

4 to work perfectly the lateral edges of the slab 1.

We know the maximum length $\ell_{\max}$, equal to A-C of Fig. 2, the slab width L and the plate speed V_M . From Fig. 5 we see that, due to the rotation of the bridge, the plate is moved upwards of
5 $\ell' = \tan \alpha \cdot L$ and, having put ℓ' slightly shorter than $\ell_{\max}$ for the reasons which will be explained later, we can obtain $\tan \alpha$ and subsequently α and $\sin \alpha$.

By adjusting the tape speed at the value $V_N = \sin \alpha \cdot V_M$, we will be sure to have a resultant $V_N - V_M$ perpendicular to V_N , as
10 it was our intention. The fact that ℓ' has been put shorter than $\ell_{\max}$ in the calculation depends on the advancement of the tape during the time t_R employed for the rotation, multiplied by V_N ; the total width of the strip will therefore be $\tan \alpha \cdot L + t_R \cdot V_N$, which we will obviously find, through simple calculations, sub-
15 stantially equal to $\ell_{\max}$, as it was our intention; if the total length is very different from $\ell_{\max}$, we will find $\ell'' = \ell' \cdot \ell_{\max} / (\tan \alpha \cdot L + t_R \cdot V_N)$.

We omit to describe the several automatisms already used for adjusting the work width, the lowering or rising of the plates,
20 the tape speed and so on, which are widely known.

Practical calculations on slabs as wide as 1.60 ms have shown that, against a tape speed of 45,7 cms/min of a conventional smoothing machine, a machine according to the invention allows to obtain with $\alpha = 4.61^\circ$ an almost double speed. This justifies
25 the expenses for the construction of the semicircular guides and the control for the rotation of the transversal bridges at each end of run.

CLAIMS

1. Continuous smoothing machine with conveying tape, characterized in that it comprises at least one smoothing plate which is movable transversally to the direction of advancement of the tape with going and return paths alternately inclined of the same angle in opposite senses with respect to the direction of advancement of the tape.

2. Smoothing machine according to claim 1, characterized in that the angle of inclination of said paths is chosen, as a function of the tape advancement speed and the plate translation speed, in such a way as to allow the plate a working path substantially perpendicular to the direction of advancement of the tape.

3. Smoothing machine according to claim 1, characterized in that said plate is movable along a transversal rotatable bridge resting on curved end guides.

Fig.1

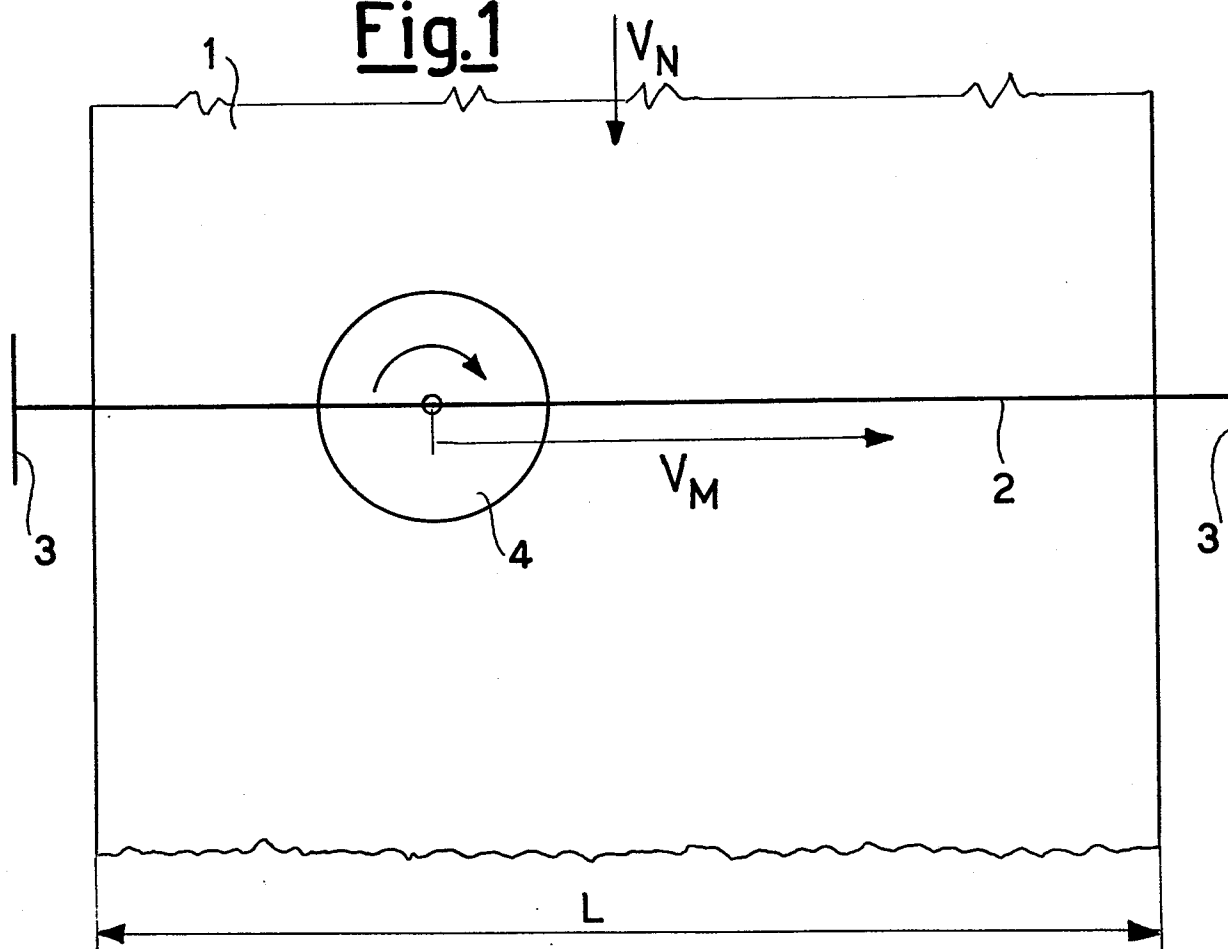


Fig.2

