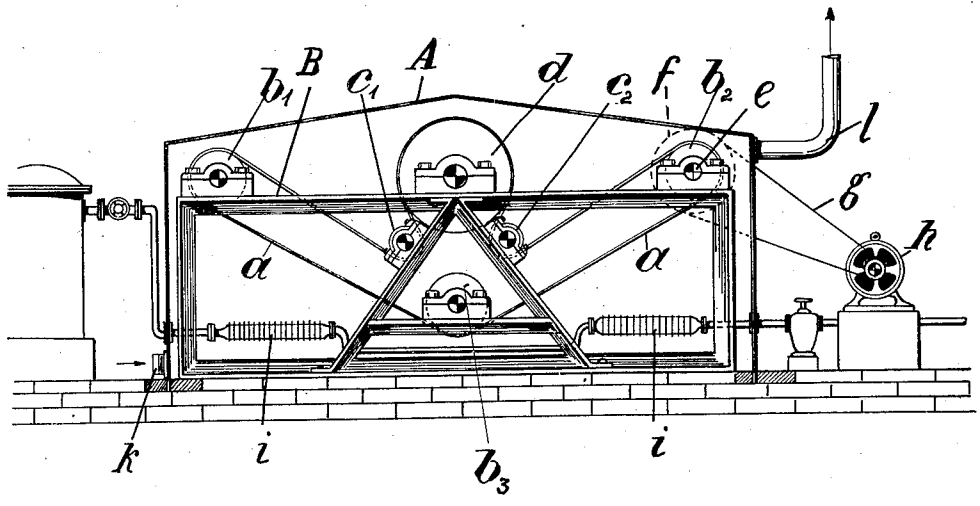
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BRAKE COVERING AND THE LIKE AND PROCESS OF MANUFACTURING THE SAME

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Inventor:
Hans Kattwinkel,
By his Atty,
Harold D. Penney

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HANS KATTWINKEL, OF COSWIG, GERMANY

BRAKE COVERING AND THE LIKE AND PROCESS OF MANUFACTURING THE SAME

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My invention relates to improvements in brake coverings and the like and the process of manufacturing the same.

The friction bodies of modern brakes, friction clutches and the like consist for the most part of a fabric which has been saturated with resin, indiarubber, varnish or the like, and then subjected to a drying process. The impregnation of such fabric with "Bakelite" is also known, and presents the advantage that the friction bodies in question have grown strong enough to bear even very heavy stresses, and, particularly at a high temperature, do not tend to become soft and "smear". This, however, presupposes a complete hardening of the "Bakelite", which presupposes a heating action continued for rather a long time. This hardening however brings with it, particularly in the case of frictional coverings manufactured in strip form, the disadvantage that the material, which in hardening becomes very brittle, does not admit of being rolled up in the manner otherwise usual, and readily splits when being riveted to the brake body or the like in question. It has therefore been necessary to rest content with a less complete hardening, and this in its turn brought with it the disadvantage that the frictional coverings in question did not acquire to the complete extent desired the properties that are advantageous for the specific purpose for which they were to be employed, more particularly the power to resist high temperatures and other physical influences. This led to a compromise. Under these circumstances however it was very difficult in practice, when hardening, always to keep the right mean between a treatment that was too brief and insufficiently intensive and that already led to a smearing result even when moderately stressed, and a hardening that was carried too far and that made the material useless on account of excessive brittleness.

The invention provides a remedy for this, in that it permits of the full hardening of the impregnated fabric and therefore of the maximum raising of the properties that are valuable for its employment as a friction body, and in addition it also enables flexible coverings to be manufactured, which admit of being rolled up and of being transported in this condition without risk of breakage, and which also admit without difficulty of being applied snugly to any curved support and of being connected therewith by riveting or the like. The fundamental idea of the new process consists in subjecting the impregnated fabric during the hardening to a continual deformation, as for example by letting it run in the form of an endless band over revolving rollers or cylinders inside the hardening stove.

For the purpose of explaining the invention an apparatus suitable for putting my improved method into effect has been illustrated in the accompanying drawing showing a sectional elevation of the apparatus.

In the example shown in the drawing the apparatus consists of an air-tight casing A made from strong sheet metal, a frame B made from steel bars, and six rollers b^1, b^2, b^3, c^1, c^2 and d. The shaft e of the roller b^2 is passed through a stuffing box mounted in the side wall of the casing A and carrying a belt pulley f connected by a belt with an electromotor h. On the said rollers b^1, b^2, b^3, c^1, c^2, d an endless band made from a suitable fabric such as asbestos fibre and impregnated with a suitable binding medium such as Bakelite is trained. Thus, when driving the rollers by means of the pulley f all the rollers are rotated, and the band a travels over the same while being continuously bent in one or the other direction.

Preferably, before beginning the hardening operation, the impregnating medium is slightly dried. For this purpose radiators i are provided within the casing A. Further, I provide means for passing a current of air through the casing. As shown, pipes k and l are connected respectively to the bottom and top parts of the casing. Otherwise the casing is constructed in the manner known in hardening ovens used for hardening Bakelite, and it is provided with means for producing high internal pressure and high temperature within the casing. While driving the rollers from the motor h the impregnating medium of the band a is hardened.

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By continuously subjecting the friction material composing the band *a* to deformation while hardening the impregnating medium, the material remains pliable even after completely hardening the same.

Experience has shown that in this manner a material is obtained, even when the hardening is carried to the highest degree, which complies in every respect with the requirements as regards flexibility and pliability, and which in its remaining properties is at least equal to those of a completely hardened frictional material. It admits of being placed on the market in the form of rolls, just as well as the more or less "soft", that is to say, only partially hardened brake bands, of being bent to the most varied diameters, and thus of being adapted to the most manifold uses, without becoming useless under heavy stresses, like the known brake coverings treated in other respects in this manner. A further advantage of the new process consists in the fact that the product made in accordance therewith always proves uniform, as the hardening process is always carried to completion, whereas in the case of the processes hitherto usual it has to be interrupted at an intermediate stage, in which case the properties of the product were dependent not only upon the duration of the hardening and the temperatures employed therein but also upon the extent of the preliminary drying, the thickness of the fabric that is being treated, and in short upon a series of conditions which it is impracticable to take simultaneously into accurate consideration, so that the consistency of the product never proved uniform.

Finally a further advantage of the new process, conditioned by the hardening being carried to completion, is that the brake material is entirely inodorous, even when applying Bakelite as impregnating means.

I claim:

1. A process for the manufacture of frictional material for brake and clutch purposes, consisting in impregnating a suitable fibre material with a medium adapted to harden, then causing said medium to harden and subjecting the material to a deformation during such hardening process so as to break it into finely divided individual particles remaining substantially coherent with the fibre material.

2. A process for the manufacture of frictional material for brake and clutch purposes, consisting in impregnating a fabric with an artificial resin in a liquid state, then causing said resin to harden and subjecting the fabric to a deformation during such hardening process so as to break it into finely divided individual particles remaining substantially coherent with the fibre material.

3. A process for the manufacture of frictional material for brake and clutch purposes, consisting in impregnating a fabric with a medium adapted to harden, then causing said medium to harden and subjecting the fabric to a continual deformation during the hardening process so as to break it into finely divided individual particles remaining substantially coherent with the fibre material.

4. A process for the manufacture of frictional material for brake and clutch purposes, consisting in impregnating a fabric with a phenolic condensation product in a liquid state, then causing said phenolic condensation product to harden and subjecting the fabric to a continual deformation during the hardening process so as to break it into finely divided individual particles remaining substantially coherent with the fibre material.

5. A process for the manufacture of frictional material for brake and clutch purposes, consisting in impregnating a textile material with an artificial resin, then subjecting the impregnated material to the influence of pressure and heat and simultaneously subjecting it to a repeated deformation so as to break it into finely divided individual particles remaining substantially coherent with the fibre material.

6. A process for the manufacture of frictional material for brake and clutch purposes, consisting in impregnating a band of fabric with a binding medium adapted to subsequently harden, partially drying said binding medium, running said band of fabric over a set of different curved paths and causing said medium to harden during such running of the band of fabric over the paths so as to break it into finely divided individual particles remaining substantially coherent with the fibre material.

7. A process for the manufacture of frictional material for brake and clutch purposes, consisting in impregnating a textile material with an artificial resin, then subjecting the impregnated material to the influence of pressure and heat and simultaneously subjecting it to a to and fro bending movement so as to break it into finely divided individual particles remaining substantially coherent with the fibre material.

8. A process for the manufacture of frictional material for brake and clutch purposes, consisting in impregnating a fabric with a medium adapted to subsequently harden, causing said fabric to run over a series of different curved paths and hardening said medium during such running action so as to break it into finely divided individual particles remaining substantially coherent with the fibre material.

9. A process for the manufacture of frictional material for brake and clutch purposes, consisting in subjecting a mixture of a fibrous material with a binding medium to a hardening process and subjecting the

material during such process to a bending movement in different directions so as to break it into finely divided individual particles remaining substantially coherent with the fibre material.

10. A frictional material for brake and clutch purposes, said material comprising, a fabric material impregnated with a finely broken phenolic condensation product.

11. A process for the manufacture of frictional material for brake and clutch purposes, said process comprising impregnating a suitable fiber fabric material with a phenolic condensation product adapted to harden by heat and pressure; and subjecting the fabric to continued high heat and air pressure from all sides while continually deforming and bending the material back and forth a large number of times until said product is substantially completely hardened and broken and the material is freely flexible.

12. A friction material comprising a member impregnated with a completely hardened finely broken artificial resin.

13. A flexible friction material comprising a member impregnated with a finely broken artificial resin.

14. A friction material comprising a member impregnated with a finely broken phenolic condensation product.

15. A friction material comprising a member impregnated with a completely hardened, finely broken phenolic condensation product.

16. A friction material for brake and clutch purposes, said material comprising, a fiber fabric material impregnated with a completely hardened and finely broken phenolic condensation product, said frictional material being substantially inodorous and freely flexible.

In testimony whereof I affix my signature.

HANS KATTWINKEL.

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