UNITED STATES PATENT OFFICE.

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PROCESS OF MAKING FRICTION FACINGS.

1,420,882. Specification of Letters Patent. Patented June 27, 1922.

No Drawing. Application filed September 24, 1919, Serial No. 325,915. Renewed October 28, 1921. Serial No. 511,105.

To all whom it may concern:

Be it known that I, FREDERICK C. STANLEY, a citizen of the United States, residing in the city of Bridgeport, county of Fairfield, and State of Connecticut, have invented certain new and useful Improvements in Processes of Making Friction Facings, of which the following is a specification.

This invention relates to improvements in process of making friction facings and refers more particularly to a clutch facing or brake lining adapted for use in motor vehicles.

The invention is directed to a novel process of making a friction facing from felted unwoven asbestos fibre saturated with a binder.

The object of the invention is to provide a process by which the friction facing has a maximum tensile strength and hardness so that it can withstand the shocks to which these facings are subjected in a motor car and also will have sufficient resistance to abrasion; while at the same time it has the proper co-efficient of friction. It is also necessary that the binder in these facings must be unaffected by oil or water in use, which object is accomplished by the present invention without in any way detracting from the other characteristics.

The process may be carried out as follows: Asbestos fibre preferably the short or low grade fibre is first ground in a suitable grinding machine or cutter. The ground material is then put into a beater mixed with the water or other solution and beaten into a pulp. The pulp is then delivered to a paper making machine as for example a wet board machine and formed into sheets or boards of suitable width and thickness. This forms an unwoven felted sheet.

As a feature of the invention, there is mixed with the pulp in the beater a sulphurizing agent, as for example sulphur, lead sulphide or analogous sulphides. In using sulphide as a sulphurizing agent, the amount employed is approximately 1.6 per cent by the weight of the asbestos fibre although this can be varied according to the characteristics of the product desired. This sulphurizing agent facilitates or hastens the cure of the binder and adds to the strength of the product and also converts the binder into a form insoluble by oil or water. It also tends to produce a uniform curing throughout the mass during the curing operation hereinafter described. It is to be noted that this re-agent is put into the pulp before the formation of the sheet and not during the saturating and curing steps of the process.

After the sheets or boards have been formed as described, they are subjected to hydraulic pressure in suitable presses and are then hung up to dry in a drying room of sufficient temperature to remove the water. The sheet is then calendered to the desired thickness and the friction facings are then cut out of the sheet. The sheets are subjected to sufficient pressure in the calender to obtain as much tensile strength in the dry sheet as is feasible. The friction facings whether clutch rings or brake linings are now ready for saturation. The saturating tank is filled with a binder. This binder may consist of 94 per cent of linseed oil, 6 per cent of gilsonite in the solution in the oil, thinned with gasoline to about 33 Baumé gravity. The friction facings are then immersed while suspended on suitable rods in this binder solution for a period of half an hour. The friction facings are then removed and put in a closed steam oven and maintained at a temperature of about 200° F. to drive off the gasoline which gasoline may be recovered and saved. This steam treatment is preferably continued from two to three hours. The friction facings are then removed to a closed baking oven where they are subjected to a temperature of about 250° F., for a period of twelve hours. The facings are then taken out of the oven and immersed in another saturating tank containing a solution 66 per cent of linseed oil and 33 per cent of gasoline, the gravity of the solution being about 33 Baumé. This second immersion takes place for from two to three minutes. In both of the saturating steps double boiled linseed oil is preferable. The friction facings are then put into a second closed baking oven and maintained at a temperature of 300° F. for twenty four hours. The heat in both of the baking ovens is preferably dry heat. The friction facings are then removed from the second oven and sand papered to micrometer size and to get a smooth finish to the facing. The facings are now ready for use.

I have given above an illustration in

which the process is actually carried out in commercial operation. It is to be understood that the temperature and length of treatment are subject to reasonable variations depending on the flexibility and strength required in the finished product. Also oils other than linseed oil may perhaps in certain cases be used and other asphalts substituted for gilsonite.

During the baking operation, the linseed oil, due to the presence of the water in the oven and also to the sulphurizing agent of the sheet is sulphurized to produce a tough hard binder. The solubility of the linseed oil before the baking treatments is practically 100% in the gasoline while after the baking treatments it is very materially reduced; and in fact the baking operation may be so carried out as to make the oil practically insoluble in gasoline. It is to be noted that by means of the double saturation and double baking, a more efficient curing of the binder is obtained and the sheet can be impregnated with larger quantities of binder. This adds greatly to the tensile strength and hardness of the finished product.

The strength and hardness of the product made by this process is far in excess of 3000 to 4000 lbs., upwards in tensile strength, over that heretofore obtained from any unwoven saturated friction facing and is even stronger than a woven sheet. The Brinnell hardness also is proportionately increased over the friction facings heretofore made and is above 15. It is to be noted that in the baking operation, the reaction develops autogenous heat or in other words exo-thermic and care must be taken to prevent the material from becoming so highly heated as to catch fire. This exo-thermic reaction results in the fact that the sulphurization is of such a character as to generate heat in addition to that externally applied. This exothermic reaction of sulphurization is well known in other arts as for example in the manufacture of air blown asphalt from petroleum residuum.

The article produced by the herein described process is claimed in my application Serial No. 405,508.

I claim as my invention:

1. A process of making a friction facing consisting in mixing asbestos pulp with the sulphurizing agent, forming unwoven friction facings of desired size and configuration therefrom, subjecting the facings to a saturation in a sulphurizable binder, baking the saturated facing at such a temperature as to cause pronounced action between the sulphur and the binder.

2. A process of making a friction facing consisting in mixing asbestos pulp with the sulphurizing agent, forming unwoven friction facings of desired size and configuration therefrom, subjecting the facings to a saturation in a sulphurizable binder, baking the saturated facing at such a temperature as to cause pronounced action between the sulphur and the binder and subjecting the facing to a second saturation and a second baking to produce a maximum tensile strength and hardness.

3. A process of making a friction facing consisting in mixing asbestos pulp with the sulphurizing agent, forming unwoven friction facings of desired size and configuration therefrom, subjecting the facings to a saturation in a sulphurizable binder, such as linseed oil, baking the saturated facing at such a temperature as to cause pronounced action between the sulphur and the binder.

4. A process of making a friction facing consisting in mixing asbestos pulp with the sulphurizing agent, forming unwoven friction facings of desired size and configuration therefrom, subjecting the facings to a saturation in a sulphurizable binder, such as linseed oil, baking the saturated facing at such a temperature as to cause pronounced action between the sulphur and the binder and subjecting the facing to a second saturation and a second baking to produce a maximum tensile strength and hardness.

5. The process of making a friction facing consisting in forming friction facings of the desired size from material containing incombustible fiber, subjecting the facing to a saturation in a sulphurizable binder, and baking the saturated facings in the presence of a sulphurizing agent and at such temperature as to cause pronounced action between the sulphur and the binder, and subjecting the facing to a second saturation and a second baking.

FREDERICK C. STANLEY.