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UNITED STATES PATENT OFFICE.

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PROCESS OF MAKING ASBESTOS FRICTION-CLUTCH RINGS.

No Drawing. Application filed May 28, 1920, Serial No. 384,901. Renewed February 15, 1923.

To all whom it may concern:

Be it known that I, LESTER KIRSCHBRAUN, a citizen of the United States, residing in the city of Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Processes of Making Asbestos Friction-Clutch Rings, of which the following is a specification.

Among the salient objects of the invention are to make a friction clutch ring suitable for use in motor cars which will have the necessary hardness, co-efficient of friction and will not be affected by high temperature induced by slippage of the clutch and which will not be affected by oils or water; to provide a product of the above character which is tough and more or less flexible and will withstand breaking strains; to provide a product in which the saturating medium for the asbestos consists of an asphalt containing oil which is or may be heavy Mexican crude which is relatively cheap.

Heretofore expensive saturants or binders as linseed oil and drying oils thinned down with gasoline have been used. This invention obviates the use of a drying oil and gasoline and permits of a very cheap petroleum oil, thus markedly reducing the cost of production. I thus use a non-drying mineral oil of asphaltic base such as Mexican crude of 12° Baumé gravity.

The invention may be carried out as follows: I first preferably form the ring of unwoven felted asbestos in the manner set forth in U. S. Patent No. 1,301,612, issued to S. Simpson, or it may be a molded unwoven ring. If desired, the woven asbestos covered wire rings may be used.

These rings are immersed in a tank containing Mexican crude petroleum of say 12° Baumé gravity which has been thinned or cut back with about 20% of gas oil as for example, mid-continental gas oil of from 32° to 34° Baumé. The use of this rather volatile gas oil facilitates saturation and tends to prevent the asphaltic oil from bleeding out of the ring during the baking operation hereinafter described. The contents of the tank are heated to about 350° F., and the rings kept in the tank about two hours. The rings are then removed and the excess of saturation allowed to drain from the rings while the rings are still kept in a heated condition not below 200° F.

At this stage the rings will have taken up about 35% to 40% by weight of saturation. The rings are then transferred to a baking oven and there subjected to a baking operation. Starting with a temperature of about 300° F. the heat in the oven is slowly and gradually raised over a period of approximately 12 to 18 hours more or less to about 500° F. Care must be taken not to raise the temperature too fast or else the saturation will bleed out, forming an impermeable film on the surface which prevents proper curing.

The oven is provided with an exhaust fan for driving out volatile products such as the gases and fumes and effective ventilation is also provided to permit the free access of air. This latter is necessary to insure proper curing. At this stage of the curing, the rings are still relatively soft and weak and the asphalt is still also soluble in the usual solvents.

After the temperature of 550° F. has been reached the curing is continued for 24 to 48 hours additional treatment at the same temperature.

At the end of the second stage of the baking operations, the asphalt has been so altered that it is entirely insoluble in the usual solvents such as kerosene or carbon tetrachloride. The length of the baking operation is determined by testing one of the rings with the above solvents.

These rings have all of the advantages and characteristics heretofore set forth in the objects of invention. The finished rings have a Brinnel hardness of from 15 to 25 and a tensile strength upwards from 2000 to 3000 pounds per square inch. Care should be taken during the curing operation to keep the temperature uniform and particularly an excessive temperature (much above 600° F.) should be avoided. The volatilized and oxidized vapors should be promptly withdrawn from the oven so as to permit free and effective access of fresh air to the rings. If desired, the rings may before saturation, have incorporated in them during their formation an oxidizing agent such as red oxide of lead to the extent of say 3% to 5%.

In its broader aspects, the invention is not limited to rings but may include any form of friction facings.

I claim as my invention:

1. A process of making a friction facing consisting in saturating a substantially incombustible unwoven felted friction facing in a bath of heated asphaltic base oil cut back with a petroleum oil of lighter gravity, drawing off any excess saturant, subjecting the facings to a baking operation at an elevated temperature which is gradually raised during the baking, and continuing the baking until the bituminous binder has been thoroughly hardened and rendered insoluble.

2. A process of making a friction facing consisting in saturating a substantially incombustible friction facing in a bath of heated asphaltic base oil cut back with a petroleum oil of lighter gravity, drawing off any excess saturant, subjecting the facings to a baking operation at an elevated temperature which is gradually raised during the baking, and continuing the baking until the bituminous binder has been thoroughly hardened and rendered insoluble.

3. A process of making a friction facing consisting in saturating a substantially incombustible friction facing in a bath of heated asphaltic base oil, drawing off any excess saturant, subjecting the facings to a baking operation at an elevated temperature which is gradually raised during the baking, and continuing the baking until the bituminous binder has been thoroughly hardened and rendered insoluble.

4. A process of making a clutch facing, consisting in saturating an unwoven felted asbestos facing in a bath of heated asphaltic base oil, subjecting the facing to a baking operation at an elevated temperature and continuuing the baking until the saturation is substantially insoluble in carbon tetrachloride.

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