July 27, 1937. A. L. FREEDLANDER 2,088,470

PRINTING ROLLER

Filed May 12, 1934

Fig. 1.

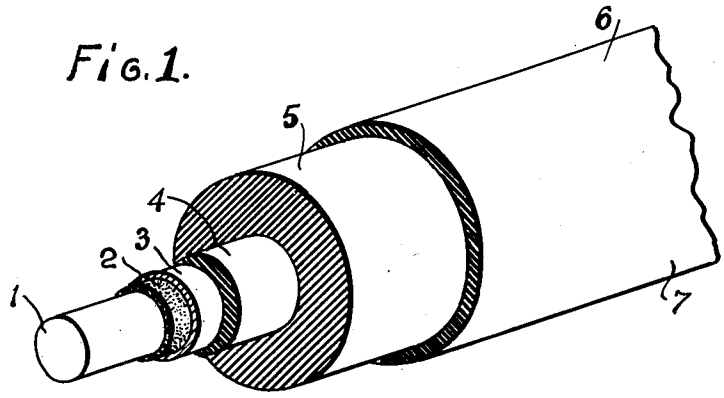
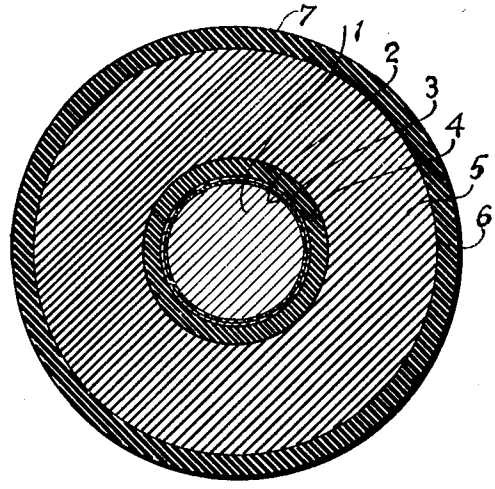


Fig. 2.



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PRINTING ROLLER

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3 Claims. (Cl. 91—67.8)

My invention relates to printing rollers and the method of making them.

It is the object of my invention to provide a printing roller that is resilient and that has a hard smooth impervious surface which is not affected by acids, inks, or any other conditions incident to printing.

It is the particular object of my invention to provide a printing roller which is not only resistant to ink, acids and other chemicals but which will have the exact amount of tack and will have this tack immediately upon being put into operation. The driers in the ink tend to destroy this tack.

It is the object of this invention to provide a renewable coating which has a marked affinity for the surface of the printing roller, which will immediately give the surface of the roller the desired tack while at the same time provide the benefit of a resilient core and a hard smooth impervious surface which is not affected by acids, inks and any other conditions incident to printing.

The surface must be a very uniform glass-like surface. The coating must flow readily and have a marked affinity for the material to which it is applied, and the result must be a uniform tack. Furthermore, it must be possible, as a part of this invention, for the tack to be retained until the coating wears off. The coating must be resistant to repeated washings by kerosene for the cleaning of the rollers.

It is a further object to provide for the renewing of the rollers by applying a new coating on the surface.

It is an object to provide for the application of such a coating in such a manner that it may be uniformly applied and drys almost instantly.

It is my object to provide a surface that will not be affected by oils nor by changes of temperature and humidity.

It is a further object to provide a surface which has the function of evenly and satisfactorily spreading the ink materials.

It is a further object to provide a method of manufacture by which all necessity for grinding the surface of the roller to finish it is eliminated and a roller, upon cleaning, can be renewed to its original condition without grinding or applying a new finish.

It is my object to provide a method by which the printing roller including its cover are cured in such a manner as to eliminate the necessity for a mold and they can be cured independently preferably by suspension in hot water under pressure.

It is my object to provide a soft inker roller having a hard impervious surface.

Driers and chemicals in ink cause a rubber roller to disintegrate in various ways. The driers cause the ink to dry or cake on the rollers. Frequently, the lint flying around in the press room tends to gather on the surface of the roller and increases this incrustation. Consequently, the rollers are washed after each run, usually with kerosene, gasoline or benzol. All of these liquids are harmful to rubber but the washing operation is essential to printing.

If the rollers do not wash up quickly, they are defective because it means that the surface of the rollers is being attacked.

A satisfactory printing roller must be one that has the right amount of tack and retains it. This tack is essential to the successful operation of the printing roller. If there is too much tack, the result is a blurred printing accompanied by ink throwing. If there is not enough tack, the rollers do not hold the ink and the result of printing is also unsatisfactory. The roller surface must be tough enough because the rollers are pressed against the irregular metal surface of the type.

Colored inks usually contain the maximum of drying materials because they are used on a higher class of printing with the better grade of smoother and harder papers. In view of the increase in color printing, these driers are becoming of increasing destructive effect on the surface of rubber rollers heretofore employed and these driers destroy the important tack of the roller surface. The roller must be soft so as to accommodate the irregularities in the type, allow accurate adjustments and take up the load on the bearing supporting the axles of the rollers.

By the present invention not only is the surface secured with the proper amount of tack while maintaining a tough hard smooth finish required, but it is possible to replace the thin cover coating of this invention on the soft rubber core, thereby making it possible to renew the surface with the minimum of expense while preserving the maximum performance of the rollers.

It will be understood that these rollers are adaptable not only for the application of inks but also of printing varnishes and adaptable for use in graining machines in order to impart imitation grain effects on metal or cheaper woods giving the appearance of expensive woods. Such rollers are also applicable in such industries as the oil cloth, wax paper printing and allied industries.

This problem of tack is most acute in the final rollers that press against the type. It is less acute in connection with the distributor rollers which distribute the ink and the intermediate rollers between the ductor or fountain rollers and the forming rollers. The forming rollers are the final rollers that press against the type.

Referring to the drawing:

Figure 1 is a perspective of the roller;

Figure 2 is a section on the line 2—2 of Figure 1.

Referring to the drawing in detail, 1 is a steel axle for the resulting printing roller which is to be manufactured by the hereinafter described process.

Assuming this axle has had dirt and grease removed from it and there is no composition on the surface of the axle, the ends of the axle are taped. The portion left exposed is that portion on which the roller is to be mounted. The taped portion is that portion which will be supported by the bearings in a printing machine in which the roller will be ultimately mounted. The untaped portion is subjected to sand blasting to give the metal a clean surface for adhesion to hard rubber. As an alternative to hard rubber adhesion, these metal axles or cores can be pickled or electrolytically cleaned and then brass or copper plated. In the latter event, the use of hard rubber would be eliminated and the soft rubber of the roller would be attached directly to the brass or copper plate.

Assuming that the metal rod is sand blasted, after sand blasting, the rods are wrapped in clean paper until ready to be cemented. They are maintained in a warm dry place until ready for the cementing operation.

The cement is made by dissolving hard rubber base stock in benzol in the proportion of one pound of hard rubber base stock to one gallon of benzol.

The metal axle or core is given two coatings of this cement. The cement is allowed to dry thoroughly before applying the hard rubber base stock.

In the drawing, 2 indicates the sand blasted surface and 3 the cement.

After the cement has thoroughly dried, the hard rubber base stock 4 is applied comprising two ply, which is wrapped around the core. This process is usually carried out in a roller-building machine so as to lay the stock evenly on the core and eliminate any trapped air. After applying the hard rubber to the metal axle, the surface of the hard rubber is treated with benzol, brushed and then allowed to dry.

Thereafter, the soft rubber base stock 5 is applied to the axle covered with the hard rubber. This stock is calendered single ply and is applied so that the calender grain is in the direction of the length of the roller. The sheets of calendered stock are preferably attached to each other with an eighth of an inch overlap. The roller is built up to the proper size allowing about one-half inch excess in diameter for sag, grinding and polishing. The edges of the roller are trimmed before curing and a single jacket liner wrapped around the roll. The building up of the soft base stock from the calendered sheets is best performed in a roller-building machine. The resulting product is submerged in a container of hot water under pressure and is kept there sufficiently long to effect a curing. The approximate temperature of the water is 250–260°, and the pressure is 150–200 lbs. The approximate period of time for a roller to be kept in the water is 3–6 hours.

Now turning aside from the provision of the yielding base, we turn to the manufacture of the cover 6 for that base. The cover comprises a cover tube made from calendered stock of a material that is not affected by oil, acids or other similar materials. A variety of materials of varying compositions is available, whose properties for this purpose and in this combination have not hitherto been employed but can be employed when the principle is understood of their application and the method of their application is suitably taught as I set forth herein.

For instance, the material divinyl acetylene which results from the vinyl derivatives of acetylene is prepared by reacting acetylene in the presence of a non-alkali catalyst comprising cuprous chloride. A non-benzenoid polymer of acetylene having the emperical formula C_8H_8 may be employed. A pre-formed drying oil which is a liquid, non-volatile polymerization product of acetylene may be used. This rubber-like material may be referred to briefly as a class of material as a divinyl acetylene polymer. Insorprene on standing passes slowly into an elastic solid having the chemical composition and many of the chemical reactions of rubber but is resistant to the attack of oils and acids. I also desire to comprehend the use of polymethylene-sulfide, a polysulfide reaction product. I also comprehend the use of a plastic polymer chloroprene (reaction product of monovinylacetylene and hydrochlorid acid); or polychloroprene and polybromoprene.

After this stock is calendered two-ply .075 ga. finished thickness, the tube is made by cutting to the proper width and by making a butt splice. The spliced seam is protected by a small strip of frictioned fabric to prevent the seam from opening up when the tube is blown on to the mandrel. When the tube is thus made, it is mounted on a metal mandrel by being inflated and, while inflated, slipped on to the mandrel. The mandrel is sherardized or plated in any manner desired to give the surface desired. The inflation is effected by the use of compressed air. After the tube is mounted on the mandrel, it is wrapped down with one or more layers of wet jacket liner.

The cover tube thus prepared is suspended in hot water under pressure with the same approximate temperature and pressure as indicated heretofore for the curing of the roller.

The cured tube is thereafter removed from the mandrel and the outside surface, as the tube exists before removal from the mandrel, is sanded. Thereafter, two coats of low temperature curing cement are applied to the ground surface of the roller, the making of which has already been described. Similar coats of cement are applied to the sanded surface of the tube.

The sanded surface of the tube is now turned to become the inside of the tube. When the cement is sufficiently dry, the cover tube is blown on to the roller by compressed air which inflates it so that it can be slipped over the relatively soft rubber roller. This presents the outside of the cover tube with a mirror-like, tough, smooth surface on the outside. It was such surface that was in engagement with the mandrel on which the cover tube was cured. The cover is then cured to the base stock comprising the soft rubber roller in hot air under pressure for the necessary time. The ends of the cover are attached to the grooved ends of the core or soft rubber roller by means of cord and tape or cord, ink and oil-resisting flexible bands. The ends are trimmed and lacquered to give a finished appearance.

Cement tack coating

I make the cement tack coating 7 by employing benzol or any other suitable vehicle in combination with the foregoing synthetic materials mentioned in this application.

The proportions can be varied according to the viscosity desired, but the viscosity should be such that the roller can be dipped in a bath of the cement, twirled in the bath and then removed, whereupon the cement drys almost instantly and the roller is ready for use in a few minutes.

This cement has an extraordinary affinity for the surface of the sleeve 6 that constitutes the outer part of the roller 5. It is possible to wash this outer surface of the roller repeatedly without disturbing the cement.

Futhermore, this cement is of broader application than the particular form of roller shown in the drawing herein as it can be applied to any ordinary rubber roller and thereby give to that roller ink resisting properties which are closely akin to those pictured in the present application. But not, of course, as perfect in result.

I have also found it to be helpful under certain conditions to treat the rollers with chemicals which have the effect of tending to open up the pores of the rubber or the synthetic compound constituting the layer 6 of the roller and then I apply the cement so as to get a better adhesion of the cement to the surface of the roller.

This cement can be applied to the uncured or unvulcanized surface of the roller. Then by slipping the sleeve on the mandrel for vulcanizing it will still retain its tacky surface. Another use for this cement is that of a varnish. In using it as a varnish on existing rubber rollers it is possible to get the exact amount of tack and also to some degree the resistance to oils, driers and other chemicals associated with ink. The difficulty with a rubber roller having this cement is that it would not have the same hard impervious surface nor would the roller be nearly as soft as that of the instant application.

It will be understood that this cement is applicable not only to rollers but to any other types of surfaces having similar purposes and similar construction.

By the utilization of this oil-proof cover stock of the special compositions hereinbefore indicated, it is possible to get all the resiliency of rubber without the disadvantage of disintegration by inks or oil to which rubber is subject.

All the advantages of rubber with a tough, smooth, impervious surface are secured on the cover together with the advantages of resiliency while, at the same time, the disintegration of the cover does not occur as when made with rubber which is subjected to the oils, driers, solvents and acids occurring in modern printing processes.

It will be understood that I comprehend within "non-rubber materials" both natural and synthetic materials and compounds which have the properties of resiliency, can have imparted to their surface an impervious condition and which are inert to inks, oils, driers, solvents, acids and temperature and moisture conditions, particularly those conditions met in printing. The compounds mentioned for this purpose have peculiar properties not found in rubber of resisting over long periods the action of such material and conditions which would deteriorate rubber.

It will be further understood that the hot water and air vulcanizing processes or their equivalent are comprehended within my invention, and any similar process is comprehended which will produce a homogeneous soft product which removes the trapped air between the plies, and results in a soft, velvety product.

It will be further understood that a cement for cementing the sleeve on to the base roller should preferably be of such a character that it will permit the easy removal of the sleeve by heating at from 160 degrees to 180 degrees Fahrenheit so that the sleeve pulls off easily at such temperature while sticking firmly at ordinary working temperatures.

I find that in very long rollers it is sometimes desirable to grind or polish the surface of the sleeve about .020 which trues the roller up to a point within .001 of an inch. The material of this sleeve permits the grinding of a very smooth surface if it becomes necessary to grind to reduce the size.

I further find that an initial tack can be imparted to the surface of the rollers if desired and the amount of tack controlled by the initial treatment if the surface of the roller is treated with rosin oil, and allowed to stand for 24 hours after having been slightly heated.

Instead of benzol, gasoline or kerosene, or a mixture of both may be used. When I refer to benzol it will be understood that these alternative products or a combination of them, or the equivalent thereof, may be substituted for benzol.

It will also be understood that I desire to comprehend within my invention such modifications as may be necessary to adapt it to varying conditions and uses.

Having thus fully described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. A new article of manufacture for use as a printing roller comprising an axle of metal, a coating thereon to which rubber adheres, a soft rubber roller body vulcanized to said coating, a relatively thin coating of non-rubber material adapted to protect the rubber within while at the same time presenting a hard impervious surface that is not affected by printing inks, and a cement coating of benzol and divinyl acetylene.

2. A new article of manufacture for use as a printing roller comprising an axle of metal, a coating thereon to which rubber adheres, a soft rubber roller body vulcanized to said coating, a relatively thin coating of non-rubber material adapted to protect the rubber within while at the same time presenting a hard impervious surface that is not affected by printing inks said coating being capable of vulcanization to the soft rubber within, and a cement coating comprising a solvent such as benzol and isoprene.

3. In combination in a printing roller of a vulcanized annular rubber roller, a resilient sheath of synthetic rubber that is resistant to oil and chemicals and ink mounted on the annular body roller, said sheath having an exterior surface formed during vulcanization that is hard, smooth and impervious, and a cement coating on the exterior of the sheath to impart tack, said cement comprising a solvent such as benzol and a synthetic rubber such as divinyl acetylene.

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