O. LINDER.

ROLLER.

APPLICATION FILED FEB. 3, 1919.

1,404,209. Patented Jan. 24, 1922.

Fig. 2.

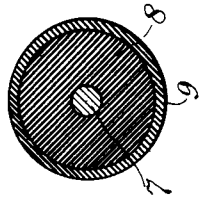


Fig. 4.

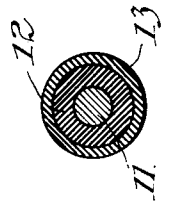


Fig. 1.

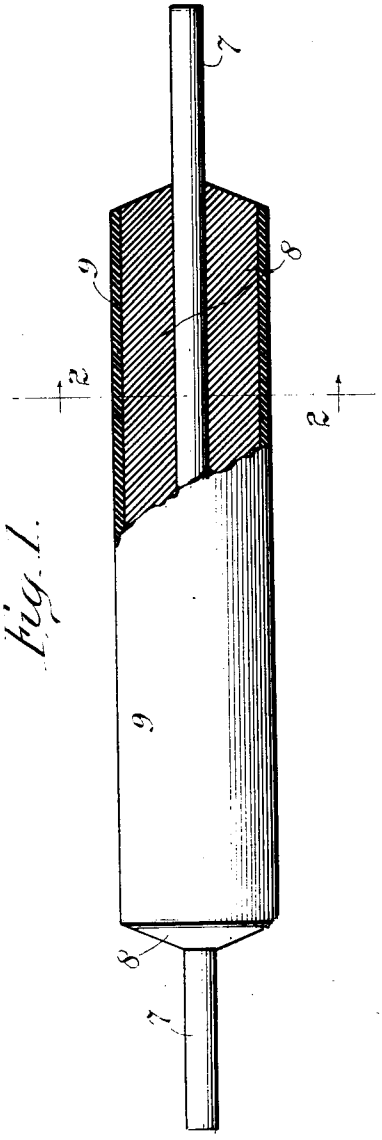
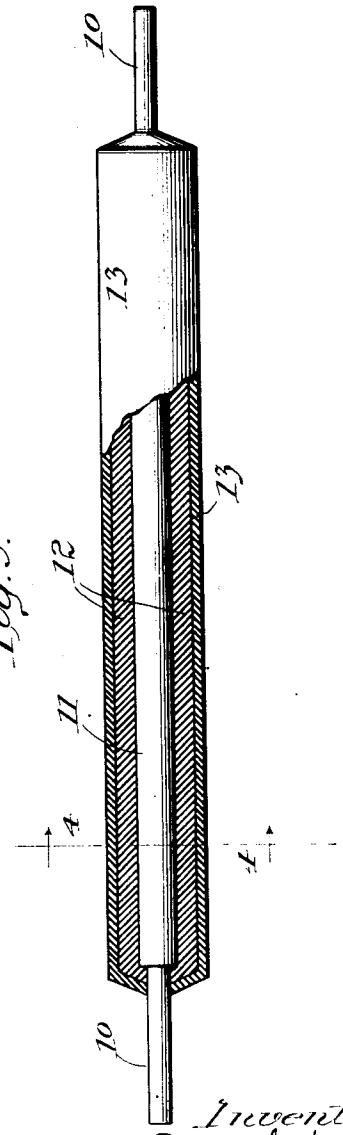


Fig. 3.



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UNITED STATES PATENT OFFICE.

OSCAR LINDER, OF CHICAGO, ILLINOIS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO IDEAL ROLLER AND MANUFACTURING COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

ROLLER.

1,404,209. Specification of Letters Patent. Patented Jan. 24, 1922.

Application filed February 3, 1919. Serial No. 274,734.

To all whom it may concern:

Be it known that I, OSCAR LINDER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented new and useful Improvements in Rollers, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawing, forming a part of this specification.

This invention relates to rollers for use in printing, lithographing, and offset presses, and for typewriters, wringers, lacquering machines, addressing machines, adding machines and similar purposes.

One of the objects of this invention is to provide an improved form of roller which may be made of any consistency or resiliency desired, and which at the same time, has a tough and elastic surface.

Another object of the invention resides in the provision of a roller which is unaffected by climatic conditions or by water, inks, and acids which are used in printing and lithographing.

Another object consists in the production of a roller which does not soften excessively nor melt in service, and which does not change its shape, shrink, swell, harden or oxidize.

Other objects of this invention will become apparent from the following description and the appended claims.

Rollers used for the purpose referred to above consist, generally, of a wood or metallic stock on which the roller material or composition is cast, molded, or placed in some other convenient manner. Heretofore, it has been the custom to use the following materials for this purpose: for printing presses, a composition of glue or gelatin with glycerin, molasses, or some other hygroscopic material; for lithographing presses, the stock is generally wrapped with flannel and this covered with leather; for typewriter platens and for many other purposes, soft vulcanized rubber is used. Again, for many purposes, vulcanized oil is utilized. Each one of these materials has its advantages and disadvantages. For example, the glue composition has the great disadvantage that it is apt to change its shape or to flow, and frequently rollers made of this material melt in service. Rubber has the disadvantage that it is liable to shrink unevenly and to harden, thus destroying the true cylindrical form of the roller. It also has the further fundamental disadvantage that it cannot be produced sufficiently soft or resilient for many purposes, particularly not for rollers which are used for printing presses. Leather-covered rollers are difficult to clean and are generally not true and have to be made and kept in condition by an elaborate working-in process and by frequent stretching and repairing. Vulcanized oil has the inherent fault that it lacks fibre strength and is therefore, mechanically weak.

Rollers constructed in accordance with this invention embody most of the advantages of the various rollers heretofore used and eliminate their principal disadvantages. Thus, rollers constructed in accordance with this invention are universal rollers which can be made of any desired consistency and of any desired resiliency, and which will not be affected by inks, acids, or water, which will not change their shape nor harden, shrink, flow or melt, and which will, at the same time, be mechanically strong.

The preferred form of roller constructed in accordance with the teachings of this invention consists of a rigid shaft or stock of metal, wood, or the like, a soft and resilient core consisting principally of vulcanized oil, and a tough surface-covering or skin of vulcanized rubber. The preferred form of the invention is illustrated in the accompanying drawings, in which—

Figure 1— is a longitudinal view of the simplest form of roller, partly in section;

Figure 2— is a section thereof taken on the plane indicated by the line 2—2 of Fig. 1;

Fig. 3— is a longitudinal view, partly in section, of another form of roller; and

Fig. 4— is a section taken on the plane indicated by the line 4—4 of Fig. 3.

In Figs. 1 and 2, which illustrate the simplest form of a printing roller, the rigid stock 7, is constructed of metal, wood, or any other material, either solid or hollow. Around this stock a layer or core 8 of vulcanized oil is formed, and surrounding this layer a surface-covering, shell, or skin 9 of vulcanized rubber. In the form of roller illustrated in Figs. 1 and 2, the skin 9 is very

much thinner than the core 8, which combination can be so as to result in a soft and very resilient roller, particularly adapted for printing presses. Figs. 3 and 4 illustrate a typical roller for lithographic presses, in which 10 designates the rigid stock, which, in this case, has an enlarged portion 11, while the smaller ends 10—10 serve as supports and are inserted in bearings in the presses (not shown). A core 12 of vulcanized oil is placed upon the stock 10, the core being covered by a shell 13 of vulcanized rubber. In the form of roller illustrated in Figs. 3 and 4 the shell 13 is somewhat thinner than the core 12, but the difference in thickness between the shell 13 and the core 12, is not as great as that between the skin 9 and the core 8 of the roller illustrated in Figs. 1 and 2. In other rollers the shell may be as thick as the core.

The core 8 is firmly bonded to the stock 7 and the skin 9 to the core 8 either by the action of vulcanizing or by any other suitable means.

Rollers made of rubber have long been known but have not been used extensively in printing or lithographing, first, because vulcanized rubber is too hard and compact for many rollers, particularly printing rollers, even if vulcanized very slightly; and, second, because of the property of rubber of shrinking unevenly and hardening. Rollers of the vulcanized oil have come into use during the past few years, but have not been entirely successful in all lines of work, particularly not on printing presses, owing to the weakness of the vulcanized oil which is manifested by the ease with which it is cut by the type rules on the printing form. Vulcanized oil has the great advantage that it can be vulcanized to any desired consistency, from semi-fluidity to the hardness of vulcanized rubber, and that this vulcanization can be easily controlled. When once vulcanized, the oil is inert to a remarkable degree and does not shrink or harden appreciably. The only disadvantage lies therein, that the vulcanized oil is mechanically weak, being of low tensile strength and low shearing strength, but possessing comparatively high compressive strength, and it lacks largely the toughness or so-called fibre strength displayed to a certain extent by glue composition, and even more so by vulcanized rubber. Since, however, this fibre strength is only required at the surface and not within the body of the roller, it is evident that a core of vulcanized oil with a skin or shell of rubber will have the necessary qualifications for a successful roller for the most severe conditions.

In the roller constructed in accordance with this invention, all the good qualities of vulcanized oil are utilized by using the oil for the greater part or body of the roller, and the required fibre strength or toughness required at the surface of the roller is obtained by covering the vulcanized oil with a skin of vulcanized rubber. Rollers constructed in accordance with this invention may be made of any degree of resilience and of any degree of toughness of the skin desired to meet the requirements of different classes of work. For printing presses, I prefer to use a very resilient core and a thin but tough skin. These conditions are obtained by having a lightly vulcanized core and a shell of highly vulcanized fairly pure rubber. For lithographic presses, I prefer to use a fairly heavy shell of vulcanized rubber and a heavily vulcanized oil core. Obviously, by varying the relative thickness and the degree of vulcanization of the shell and core, and the quality of the rubber used for the shell, almost any condition of resiliency and toughness can be obtained.

The improved form of roller herein described is characterized by the tough, strong, and elastic surface of rubber, and the resilient and unchanging interior of vulcanized oil. Thus, even if there is some shrinking or hardening of the rubber skin due to the property of rubber hereinbefore referred to, which has seemingly not been overcome by any known treatment thereof, such shrinkage or hardening will affect the roller itself only to a negligible degree, because the bulk of the roller material is vulcanized oil, which is not subject to these undesirable changes. Again, the improved roller can be made of any degree of softness and resilience, a feature which is not possible in rollers made entirely from rubber. The main objections to rubber rollers are therefore eliminated.

A further characteristic of this improved roller resides in the fact that the rollers cannot become excessively soft or melt under any conditions of service. Therein lies the great advantage of this roller over glue composition rollers. Glue composition generally starts to flow at or near a temperature of 120 degrees F., and it very frequently happens in practice that such glue rollers melt during service in the printing presses. In the improved form of roller described herein such a condition is impossible, the vulcanized oil, even if vulcanized very slightly not being subject to flowing or melting until it reaches a temperature of about 300 degrees F.

Vulcanized rubber has a still higher point of flowing. Such a temperature is never reached when rollers are used in presses of the character hereinbefore referred to.

Another advantage over glue composition rollers resides in the fact that the new roller herein described is not affected by climatic or atmospheric conditions, and consequently one roller can be used throughout different

seasons of the year, while glue composition rollers must be made for either winter or summer use.

Rollers constructed in accordance with this invention can, evidently be produced in various ways well known in the art of roller-making. Thus, for instance, as an illustration, the core 8 may be first cast on the stock 7, for example by the process disclosed by Wolever in U. S. patent No. 1,161,756, issued November 23, 1915. A vulcanized rubber tube may then be slipped over the core, to which it may be cemented so as to form the skin 9. Or, if desired, an unvulcanized tube or rubber compound prepared for vulcanization may be slipped over the core and vulcanized after it is in position. Likewise a sheet of rubber compound prepared for vulcanization may be wrapped over the core and then vulcanized. The vulcanization may be done in any one of the well-known ways and may be carried out either in the open, in a mold or after wrapping the roller. Instead of casting the core first, the process may be reversed by starting with the shell of rubber and casting the core inside. Obviously, a very large number of various processes may be utilized for producing the rollers.

In order to facilitate the working of the rubber, it will be generally convenient to compound it with the usual ingredients, such as reclaimed rubber, factis, lithopone, litharge, magnesia, etc.

In referring to "rubber" in this specification, it is to be understood that either pure rubber or compounded rubber is meant, such as is ordinarily used for soft rubber goods.

The vulcanization may be carried out to any desired extent and in any one of the standard ways:— by the hot process, by compounding with sulphur and then heating to the vulcanization temperature, or by the cold process, by dipping in diluted sulphur chloride. Similarly, in the case of the core, any desired oil which can be vulcanized may be used, as, for example, linseed oil, corn oil, soya bean oil, cottonseed oil, etc., or any mixture of oils with or without admixtures of filling materials or other compounding ingredients. The oil may likewise be vulcanized either by the hot method with sulphur direct, or by the cold method with sulphur chloride, in the manner well known in the art. Vulcanization of the oil frequently causes a somewhat porous product, but this is immaterial in the case of the vulcanized oil core, and is in many cases even desirable, because the presence of gas cells tends to increase the resiliency of the core. If, however, such porosity is not desired, it can be prevented, or at least reduced, by carrying out the vulcanization under pressure.

The roller of this invention may be provided with any kind of a surface desired. In many cases it will be necessary to grind the roller so as to provide it with a true cylindrical surface. For most purposes a smooth surface of the roller is desirable. In some cases, however, as for example, in certain classes of lithographic work, a rough or grained surface is preferred. In such cases this surface may be imparted to the roller, giving it the desired grain, by grinding, sand-blasting, cutting or in any other well-known manner.

The rubber skin of the roller may be extended only over the active surface of the roller, as indicated in Fig. 1, or it may extend over the exposed ends of the core, as shown in Fig. 2.

It is evident that this invention is not confined to the two materials mentioned, namely, vulcanized oil and vulcanized rubber, and that either one or both can be substituted by materials of equivalent characteristics.

Obviously, this invention is not limited to the specific form thereof herein illustrated and described, but is capable of other applications and many variations within the spirit and scope of the invention as pointed out in the following claims.

I claim as new and desire to secure by Letters Patent of the United States:

1. As a new article of manufacture, a roller consisting of a rigid stock, a core of vulcanized oil, and a skin of vulcanized rubber.

2. As a new article of manufacture, a roller consisting of a rigid stock, a core of vulcanized oil, said oil being vulcanized directly to said stock, and a skin of vulcanized rubber, said skin being vulcanized directly to said core, said stock, core and skin being firmly bonded together.

3. As a new article of manufacture, a lithographing roller consisting of a rigid stock, a body of vulcanized oil, and a surface-covering of vulcanized rubber having a grained surface.

In witness whereof, I have hereunto subscribed my name.

OSCAR LINDER.