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PAPER.

989,425.

Specification of Letters Patent.

Patented Apr. 11, 1911.

No Drawing.

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To all whom it may concern:

Be it known that I, KNIGHT E. ROGERS, a citizen of the United States, residing at South Manchester, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Paper, of which the following is a specification.

This invention relates to paper and in a copending application Serial No. 540,639 filed January 28, 1910 I have described in detail a method of making paper comprising my invention.

There are several objects which I have in view, viz., the production of paper possessing the maximum amount of pliability or flexibility and also possessing a satin-like and smooth surface finish. Paper possessing these characteristics is particularly useful in many different connections for example in the textile art and also in the electrical art. Paper having a high surface polish presents unusual dielectric strength and owing to the flexible nature of the article to which I have alluded, the material can be curved and bent in commutator construction, for example, without possibility of its breaking, this being due to the fact that the paper is impregnated with or permeated by a suitable lubricant and the pulp from which the paper is made can vary greatly and the same remark applies to the lubricant. I find that I can secure excellent results with a pulp made from rags and rag shavings while the lubricant consists of a soluble, fatty acid soap for example as what is known in commerce as "neutral chips." The proportions of these ingredients when I use them, may vary considerably although I will hereinafter describe a satisfactory mixture solely to comply with the statute or to enable those skilled in the paper art to practice the invention.

In practicing my method I make paper precisely similar to any one of the common methods now in vogue one of which I might set forth somewhat in detail, the same being as follows: After cotton rags have been cleaned they with rag shavings are introduced into a beating engine with water and there macerated to produce a pulp. When the pulp is of the desired fineness or grade it is dropped into the "stuff-chest" of a paper machine where it is formed into a web or sheets, said web or sheets being dried and finally calendered. Paper made in accord-

ance with this and other existing methods cannot be friction-finished and to secure such an article I incorporate in the pulp material at some point before it is dried or when the same is in a substantially wet or semi-plastic condition, a suitable lubricant and there are of course many lubricants which I might employ. I have obtained excellent results by adding the lubricant to the pulp material while the latter is in the beating engine as in this way I can utilize the said engine for securing a most thorough association of the ingredients or the permeation of the lubricant into every part of the pulp mass. It is conceivable of course that I might mix the lubricant with the paper pulp material before the same is put in the beating engine or while said material is in its raw or crude state. The proportions of the pulp and lubricant may vary considerably. I get a good mixture by using about ten pounds of the lubricant to about five hundred pounds of the pulp, the lubricant being introduced into the beating engine prior to the discharge of the pulp therefrom into the stuff chest. I may as an illustration subject the pulp to the operation of the beating engine for approximately ten hours and when the lubricant is put into the beating engine the two ingredients can be subjected to the action of said engine for about half an hour which I find assures a thorough amalgamation of the same. It will, therefore, be apparent that I employ about 2% of the soap lubricant to the pulp or other paper material. This proportion enables me to get the best results. I may employ a greater proportion of the soap, but any thing more than 5% is ruinous to the friction finish which is my ultimate desire.

I find that when the pulp is lubricated in the manner set forth the resultant sheets are very flexible. I produce a suitable lubricant by mixing neutral chips with enough water to make a free flowing mixture and this I pour into the beating engine at the time already indicated. As will be inferred from what I have already stated there are other satisfactory lubricants; for example any of the saponifying oils to which I can add sufficient alkali to saponify the same. But I have obtained excellent effects from the soap mixture which presents a suitable form of lubricant having an affinity for water.

The lubricated, dried sheet is rendered exceedingly susceptible to friction finishing

an operation which involves the application of pressure to and friction upon the lubricant-impregnated sheet although there may be cases where I should simply calender
5 such a sheet. A friction-finished sheet, however, as will be understood possesses unusual surface smoothness and polish, and fits the same especially to the uses to which I have referred. There are various ways in which
10 I can obtain the requisite friction finish although a sheet-supporting bed plate and a cooperating ironing or polishing member constitutes an advantageous means for this purpose. The bed-plate when employed
15 will be so mounted as to withstand the great pressure of and friction produced by the friction-finishing member. The latter may consist of a metallic body having a polishing surface, the sheets to be friction-finished being laid upon the bed-plate and
20 being traversed by the polishing surface of the friction-finishing member which may be supported over the bed-plate in any desirable manner and be reciprocated or oscillated in any convenient way. The pressure developed by such a member is considerable although it will vary with the grade of the paper. As an illustration I would apply
25 to a comparatively thin board or paper a pressure of substantially five thousand pounds to the square inch. When the sheet is impregnated with the lubricant I find that there is no tendency of the polishing member disturbing the fibers of the paper
30 but on the contrary this actually tends to increase the "lay" of the fibers and add to

the smoothness of the surface finish the result being that in a sheet including my invention there is no fuzz or hair on the surface.

As a feature of the invention I claim not only the finished article; that is a lubricant-impregnated paper or a lubricant-impregnated, friction-finished paper, but also
40 a pulp containing such a lubricant which can be sold to paper-makers as an article of manufacture to be made up by them into the finished article.

What I claim is:

1. Paper impregnated with a lubricant consisting of a soluble, fatty acid soap, there being about 2% of said lubricant to the paper material.

2. Paper impregnated with a lubricant, there being not over 5% of said lubricant to the paper material, said lubricant consisting of a soluble, fatty acid soap.

3. Paper impregnated with a lubricant consisting of a soluble fatty acid soap having a friction finished surface.

4. Paper impregnated with a lubricant, there being not more than 5% of lubricant to the paper material, said lubricant consisting of a soluble fatty acid soap and the paper having a friction finished surface.

In testimony whereof I affix my signature in presence of two witnesses.

KNIGHT E. ROGERS.

Witnesses:

HEATH SUTHERLAND,
F. E. ANDERSON.