

# UNITED STATES PATENT OFFICE.

FREDERICK GEORGE ANNISON, OF LONDON, ENGLAND, ASSIGNOR TO THE PUBLISHING, ADVERTISING AND TRADING SYNDICATE, LIMITED, OF SAME PLACE.

## ENAMELED PAPER AND COMPOUND USED TO ENAMEL SAME.

SPECIFICATION forming part of Letters Patent No. 601,927, dated April 5, 1898.

Application filed September 10, 1897. Serial No. 651,249. (No specimens.)

*To all whom it may concern:*

Be it known that I, FREDERICK GEORGE ANNISON, a subject of the Queen of Great Britain, and a resident of London, England, have invented certain new and useful Improvements in Box or Enameled Papers and the Compound Used to Enamel the Same, of which the following is a specification.

Heretofore enameled papers have usually been made by applying to the paper base a compound of liquid sizing and finely-divided pigments. Such enamel coatings when dry are quite friable and easily crack and disintegrate, and when exposed to moisture, particularly if accompanied by friction, the enameled surface, together with any impression thereon, is destroyed. It has been proposed to render them waterproof by adding to the compound waterproofing materials—such, for instance, as gold-size, albumen, alum, and various oils. The coatings, however, are only partially waterproof initially and soon become less so, and while their surfaces have generally been well adapted to receive impressions, as by printing, lithographing, &c., there is a tendency well known in the trade to “scab” or “peel”—that is to say, when the papers are subjected to a large number of successive impressions—as, for instance, in a printing-press or from lithographic stones, for the application to the surface of a variety of colors, or for other purposes—the enameled coating is injured or broken down and a separation thereof in places from the paper or base occurs, portions of the surface of the coating frequently adhering to the face of the type, stone, or plate from which the impressions are being taken. Furthermore, the papers are liable to irregularly stretch and shrink, because of absorption of moisture from the lithographic stones or from the atmosphere, and it is therefore difficult to deposit each color or impression in its proper position relatively to other colors or impressions—that is, to make the various colors register correctly with reference to the design and to one another. So much is this the case that in high-class work the printer often first gives the paper a printing of a uniform coat of lithographic varnish mixed with a little

color, so as to waterproof the surface before printing the proposed design; but even this, though it reduces, does not altogether remedy, the stretching and shrinking of the paper, which is one of the greatest difficulties with which the printer has to cope where repeated impressions are required, each one of which must register with its predecessor.

The foregoing are the principal objections or imperfections existing in enameled or box papers as heretofore made.

The primary object of my invention is to produce an enameled paper having a permanently waterproof coating intimately united with the paper or base that is tough and elastic and has a superficial face that readily receives impressions of all kinds in the ordinary processes of printing, lithographing, &c. Such coatings, being non-absorbent, tough, and elastic, are not only durable, but are not subject to stretching and shrinkage when alternately exposed to moisture and drying and are capable of receiving without injury or impairment any desired number of impressions, and, being intimately and tenaciously united to the base-sheet, repeated applications of pressure thereupon do not produce lamination or separation, nor does the draft of the stone, plate, or type tend to produce “scabbing” or “peeling.” Moreover, the coating of my enameled papers is of such character that the inks and colors “cover” it more readily than the surfaces of ordinary enameled papers, and hence to produce a given effect or body of color upon the surfaces of my papers considerably less ink is required and less pressure in impressing it upon the surface. This peculiar characteristic of my papers is, I believe, due to the fact that an exceedingly thin superficial absorbent surface is presented by a multitude of very fine particles of pigment, as hereinafter described, beyond which the inks and colors cannot penetrate, because of the non-absorbent quality of the body of the coating.

I first prepare a compound of nitrocellulose dissolved in camphor or its equivalent and wood-alcohol, grain-alcohol, or methylated spirit or their equivalents, and is in fact what is variously known as “celluloid,” “xylo-

nite," "ivorine," &c., in a fluid form. I prefer to first mix the ingredients to about the consistency of ordinary putty, and then reduce by addition of alcohol or spirit to a liquid condition—for instance, to about the fluidity of olive-oil at ordinary temperatures. I then add a large quantity (as compared with the nitrocellulose) of finely-divided dry pigment of the color desired and grind the whole in an ordinary cone-mill. During the grinding I add castor-oil to increase the toughness and elasticity of the compound, or any oil producing the same or substantially the same results. This compound may be applied to the paper or base in the manner and by the apparatus usually employed in making ordinary enameled papers. I have discovered that a compound of this character unites intimately with the paper base and takes a tenacious hold thereon. Successive coats may be applied until the desired thickness of coating has been built up, and each unites intimately with the one upon which it is superposed. Each coating should be dried before the next one is applied, and I prefer to employ a drying temperature of from 125° to 200° Fahrenheit. After the final coat the surface may be calendered by rolls heated from about 125° to 200° Fahrenheit, and may then be embossed, if desired, by rolls having the same temperature, or calendering or embossing, or both, may be omitted. This compound of nitrocellulose insures an intimate union of the coating and the base, and even when as many as fifteen pounds of some dry pigments per pound of nitrocellulose are employed, the coating is waterproof and permanently retains this characteristic, as well as its toughness and elasticity, which are increased by the oil used in the compound. Surfaces of celluloid, xylonite, ivory, &c., are not adapted to receive impressions from printing-presses, lithographic stones, &c.; but the coating of my improved papers receives with facility and retains all kinds of impressions of most, if not all, kinds of colors. The reason for this, I believe, is that owing to the large amount of dry pigment I employ, an infinite number of minute particles of the pigment are exposed at the surface of the coating and act to receive and retain printing-inks and colors by whatever process applied. At the same time the nitrocellulose element of the compound renders the coating as a whole waterproof. The capacity for receiving and retaining impressions, if due to an absorptive character of the face, is superficial only.

My invention therefore contemplates that such quantity of dry pigment shall be used as not to overcome the binding quality of the nitrocellulose compound or destroy its waterproof character, and yet enough is to be used to obtain a face of such character as to receive and retain impressions printed thereon.

Some dry colors when ground up with my menstruum, as hereinbefore described, give more body than others, while the number of

colors which may be employed is great. For example, hardly more than one-third as much ultramarine-blue should be used to a given quantity of menstruum, as of French zinc white, since that blue is so much more absorbent that it calls for a much larger proportion of menstruum to bind it. The nature of the case, therefore, does not permit of a fixed quantitative rule applicable to all colors. The best general rule known to me I have already given, and it will be quite sufficient to enable one skilled in the art to practice my invention when aided by the specific examples hereinafter given and the general knowledge of the comparative characteristics of these colors acquired in the prior art; but I might say that in my own experience, so far as I have gone, I have found that if enough color has been added to my menstruum to give the ordinary appearance of standard enameled paper, but not so much but that the color is firmly bound by the menstruum when dried, I have a waterproof tough elastic surface firmly attached to the paper and which will well receive and retain impressions from the various inks and colors ordinarily used in printing on enameled papers.

In have in my practice obtained satisfactory results when using the following proportions:

Example 1: For terra-cotta-surfaced paper thirteen and a half pounds French zinc white, one pound permanent brown, one and a half pounds scarlet Turkey red, and one and a half pounds dark yellow ground in a menstruum composed of one and a half pounds of nitrocellulose, one and a half pounds of camphor, three gallons of alcohol, and seven gills of castor-oil.

Example 2: For salmon-surfaced paper thirteen and a half pounds French zinc white, ten twenty-fourths of an ounce of permanent brown, ten twenty-fourths of an ounce scarlet Turkey red, and three ounces of dark yellow ground in a menstruum composed of one pound two ounces of nitrocellulose, one pound two ounces of camphor, two gallons and one pint of alcohol, and six gills of castor-oil.

Example 3: For white chromo-surfaced paper thirteen and a half pounds French zinc white ground in a menstruum composed of one pound nitrocellulose, one pound of camphor, two gallons of alcohol, and six gills of castor-oil.

As stated, I may apply either one, two, three, or more coats of the compound, according to the thickness of the coating desired. I prefer, however, that each coating shall be thin and that the desired thickness be obtained by successive coats. Upon any one of the earlier colored coatings I may apply a coating of the nitrocellulose compound, preferably containing oil but no pigment. I may therefore make the first coat, or the second coat, if there be more than two, less rich in pigment, the following coat or coats containing such quantity of pigment as to bring the

surface up to the desired shade and produce at the same time a character of surface adapted to receive impressions, as stated.

By calendering and brushing in the usual way my papers may be given a highly-polished surface and with or without this treatment may also be beneficially employed as box-papers and the like.

For the purposes of this description and the claims I designate the amount of dry pigment used as in excess of the proportion of nitrocellulose compound, meaning thereby such quantity of pigment in relation to the quantity of the menstruum in which it is ground as will give a surface of the character described, but not so much as to overcome the binding quality of the nitrocellulose compound or destroy its waterproof character. A coating of this character readily receives all kinds of protective varnishes that may be applied to cover and protect the printed impressions, and if such a varnish be used I may employ what are known as "celluloid varnishes," which, as is well known, are very fluid solutions of celluloid and like compounds.

Though the primary object of my invention is to produce the enameled paper of the character described, still as my described compound is believed by me to be novel and as such a compound may be used in other relations than that hereinbefore described, and particularly where it is desired that surfaces of the compound shall receive printing and lithographic impressions, the compound *per se* constitutes a subsidiary feature of my invention.

I claim as my invention—

1. As a new article of manufacture, the herein-described enameled paper, the enameled surface of which is adapted to receive and retain printing and lithographic impressions, which enameled surface consists of a nitrocellulose compound of the character described and pigment, the proportion of the latter to the composition being larger than, or in excess of the proportion of the nitrocellulose compound for the purpose set forth.

2. As a new article of manufacture, the herein-described enameled paper, the enameled surface of which is adapted to receive and retain printing and lithographic impressions, which enameled surface consists of a nitrocellulose compound of the character described containing oil and pigment, the proportion of the latter to the composition being larger than, or in excess of the proportion of the nitrocellulose compound for the purpose set forth.

3. A composition of matter to be used as an enamel adapted to receive printing and lithographic impressions, consisting of a nitrocellulose compound of the character described and a pigment, the proportion of the latter to the composition being larger than or in excess of the proportion of the nitrocellulose compound, substantially as described.

In testimony whereof I have hereunto subscribed my name.

FREDERICK GEORGE ANNISON.

Witnesses:

FRANK S. OBER,

EDWARD C. DAVIDSON.