

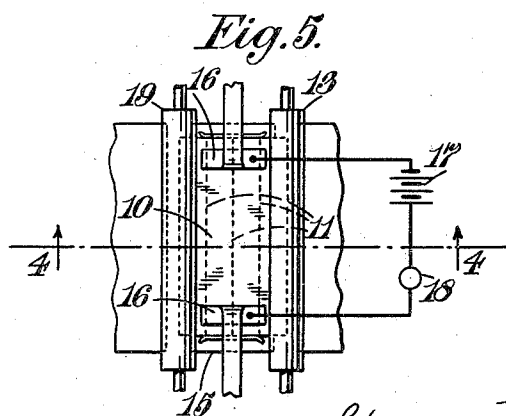
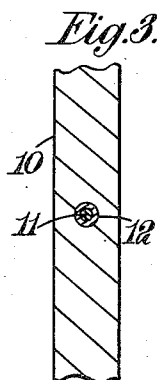
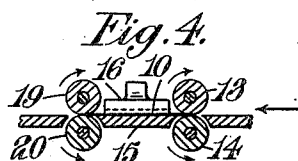
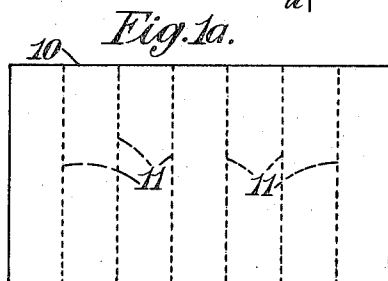
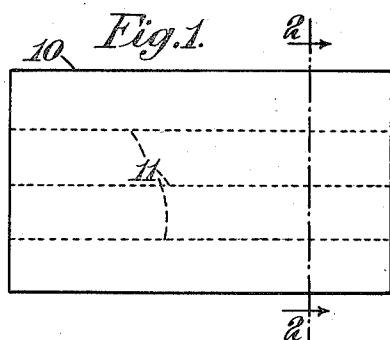
Jan. 10, 1939.

S. B. CHAMBERLAIN

2,143,406

PAPER FOR SECURITY DOCUMENTS AND PROCESS OF MANUFACTURE THEREOF

Filed March 19, 1937



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UNITED STATES PATENT OFFICE

2,143,406

PAPER FOR SECURITY DOCUMENTS AND
PROCESS OF MANUFACTURE THEREOFStanley Beaumont Chamberlain, London, Eng-
land, assignor to Portals Limited, Whitchurch,
Hampshire, England, a British companyApplication March 19, 1937, Serial No. 131,902
In Great Britain June 23, 1934

7 Claims. (Cl. 92—40)

This application is a continuation-in-part of my former application Serial Number 26,688, filed June 14th, 1935.

This invention consists of improvements in or relating to the manufacture of security documents such as bank notes or paper therefor, the main object being to minimize the risk of forgery or, in other words, to enable the genuine documents to be readily identified.

A subsidiary object is to enable considerable numbers of bank notes for example to be rapidly tested electrically or visually to separate those manufactured in accordance with this invention from those which have not been so manufactured.

This invention includes a process of manufacturing paper for security documents, such as bank notes, which consists in laying in the web throughout its length during manufacture of the paper a continuous filament of flexibility of the order of that of the paper, and prior to such insertion in the web rendering the filament electrically conducting by applying thereto a metallic film of extreme thinness.

A preferred form of this invention comprises a method of preparing flexible paper for security documents such as bank notes in which a continuous thread or filament of artificial silk coated with a layer of non-corrodible metal of substantially molecular thickness and of flexibility of the order of that of the paper is laid in the paper during manufacture. The coating of the filament with non-corrodible metal may be effected by any process such as the process of electrode dispersion or sputtering, or by spraying the disintegrated metal in a hot blast. This invention also includes in its scope paper for use in security documents such as bank notes in which a continuous thread or filament thinly coated or impregnated with a non-corrodible metal (e. g., a thread or filament of artificial silk thinly coated with a precious metal such as gold) is embodied in the paper. This invention includes a method of manufacturing paper for use in security documents such as bank notes in which, while the paper is being formed on the usual screen, a metallized continuous thread or filament is applied taut along the surface of the screen so that it becomes embodied in the paper.

A feature of the invention is that the thread or filament is of the same order of flexibility as that of the paper.

In the case in which a longitudinally moving or rotating screen is used for the production of the paper from the pulp, metallized continuous

filaments or threads are fed longitudinally along the surface of the screen at the same linear speed as the screen and in a taut condition so that the thread or filament is embodied in the paper as it is formed.

The following is a description by way of example of one method of carrying this invention into effect.

It is assumed that the paper-making machine belongs to the type in which the pulp is fed from a trough on to a screen which has a longitudinal feeding movement and may or may not have a lateral shogging or oscillating movement and that when the paper fibres have become felted together and leave the screen they pass between rolls.

A continuous thread or filament of artificial silk is first prepared and may be formed from any of the usual cellulose esters or ethers such as as viscose, cellulose acetate, benzyl cellulose or other material used for making artificial silk threads or filaments. The resulting thread or filament is then passed through a metal-coating apparatus in which a precious metal, such as gold or silver in a state of very fine subdivision, is sprayed or sputtered on to the thread or filament so as to impart thereto a very thin metallic coating of preferably substantially molecular thickness and preferably an electrically conducting coating.

The coating may be applied by one of several methods, for example by means of the process known as "cathode dispersion" or "cathode atomization" wherein an article to be coated with a metal is placed alongside the anode or itself forms the anode in a high potential electric discharge system, the metal to be atomized or dispersed comprising the cathode of the system. Alternatively, the metal coating may be applied to the threads or filaments by thermal volatilization of the metal. This may be effected by exposing the threads or filaments in a vacuum chamber to the metal vapour produced by heating the metal such as by high frequency alternating electric current.

In the case where gold is used the resulting thread or filament is gilt thread or filament which is collected on a bobbin or cop. The metallized thread or filament is now fed from the feed end of the paper-making machine under a suitable tension control, the thread or filament being laid longitudinally along the screen of the machine and passed between the rolls aforesaid with or without the use of additional guiding rollers, the rate of feed of the thread or

filament being the same as the rate at which the paper is removed from the screen. The thread or filament on the supply bobbin may be so mounted that the thread or filament partakes of the same lateral oscillating movement as the screen. The result is that the metallized continuous thread or filament is embodied in the paper and there may be two or more threads or filaments thus introduced. The diameter of the filament may be 25-40% of the thickness of the paper.

In the manufacture of bank notes it is preferable to cut the paper so that the metallized thread or filament runs across the note in either direction.

The resulting notes are characterized by the presence of the metallized continuous flexible thread or filament, which, although not conspicuous, can be readily detected when desired.

In one method of detecting the notes automatically the notes are fed between rollers into a device provided with two electrically conducting surfaces so disposed as to contact respectively with the metallized threads or filaments in the notes, such conducting surfaces being disposed in an electric circuit which is completed with the aid of the electrically conducting continuous thread or filament (when present) so as to operate a signal or recorder.

It will be understood that the invention may be applied to paper manufactured by processes other than the continuous process, e. g. to hand-made paper.

With reference to the accompanying drawing:—

Figure 1 represents a bank note having the filaments laid in the paper in a direction horizontal to the design;

Figure 1a represents a similar bank note but with the filaments vertical to the design;

Figure 2 is a diagrammatic illustration of the filaments laid in the paper;

Figure 3 is a similar illustration showing a compound filament;

Figure 4 is an illustration of the detecting apparatus;

Figure 5 is a plan view of the same apparatus.

The bank note 10 has a continuous flexible filament 11 laid within it. This filament may be composed of a core 11 of artificial silk surrounded by a very thin coating of metal or metallic compound 12. The note is fed into the detecting machine through rollers 13, 14 and supported at its ends by immovable jaws 15. Corresponding movable jaws 16 descend and grip the opposite edges of the bank note. These jaws form part of a simple electrical circuit containing a battery 17 and ammeter 18 and the presence of the continuous filaments completes the circuit, causing the ammeter to give a reading. The jaws 16 are then raised and the note is drawn out between the rollers 19 and 20.

I claim:

1. The herein described process of manufacturing paper for security documents, such as bank notes, which consists in laying in the web throughout its length during manufacture of the paper a continuous filament made from an organic compound of flexibility of the order of that of the paper, and prior to such insertion in the web rendering the filament electrically conducting throughout the length of the paper by applying thereto a continuous metallic film of extreme thinness.

2. The herein described process of manufacturing paper for security documents, such as bank notes, which consists in laying in a substantially taut condition in the web throughout its length during manufacture of the paper a continuous filament made from an organic compound of flexibility of the order of that of the paper, and prior to such insertion in the web rendering the filament electrically conducting throughout the length of the paper by applying thereto a continuous metallic film of extreme thinness.

3. The herein described process of manufacturing paper for security documents, such as bank notes, which consists in laying in the web throughout its length during manufacture of the paper a continuous metal-coated electrically conductive filament made from an organic compound of flexibility of the order of that of the paper.

4. As a manufactured product, flexible paper for security documents, such as bank notes, comprising paper having embodied in it a continuous flexible filament of artificial silk which is coated with a continuous electrically conductive layer of precious metal of substantially molecular thickness by electro-dispersion and extends along the entire length of the paper.

5. As a manufactured product, a flexible bank note having embedded therein a continuous flexible filament made from an organic compound and coated with a continuous electrically conductive layer of non-corrodible metal of extreme thinness by electro-dispersion and lying parallel with one side of the note.

6. As a manufactured product, flexible paper for security documents comprising paper having embedded therein a continuous flexible filament of artificial silk coated with a continuous electrically conductive layer of non-corrodible metal of extreme thinness by electro-dispersion, the diameter of said coated filament being about 25% to about 40% of the thickness of the paper.

7. As a manufactured product, flexible paper for security documents, comprising paper having embedded therein a continuous flexible filament of organic material coated with a very thin continuous electrically conductive layer of non-corrodible metal, the flexibility of the filament being of the order of that of the paper.

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