E. BRANDT.

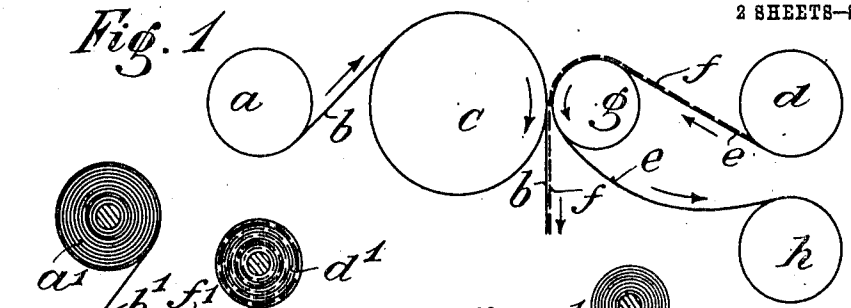
PROCESS OF COATING WEBS OF PAPER WITH LEAF METAL.

APPLICATION FILED JULY 15, 1913.

1,096,822. Patented May 19, 1914.

2 SHEETS—SHEET 1.

Fig. 1



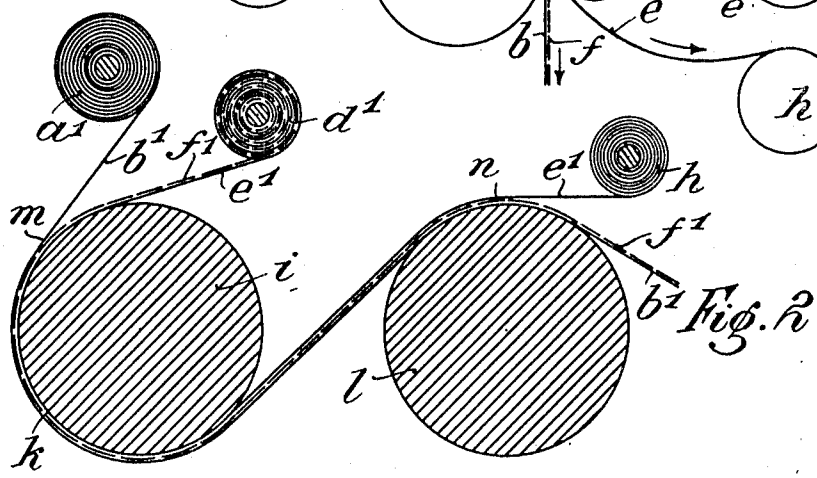




Fig. 2

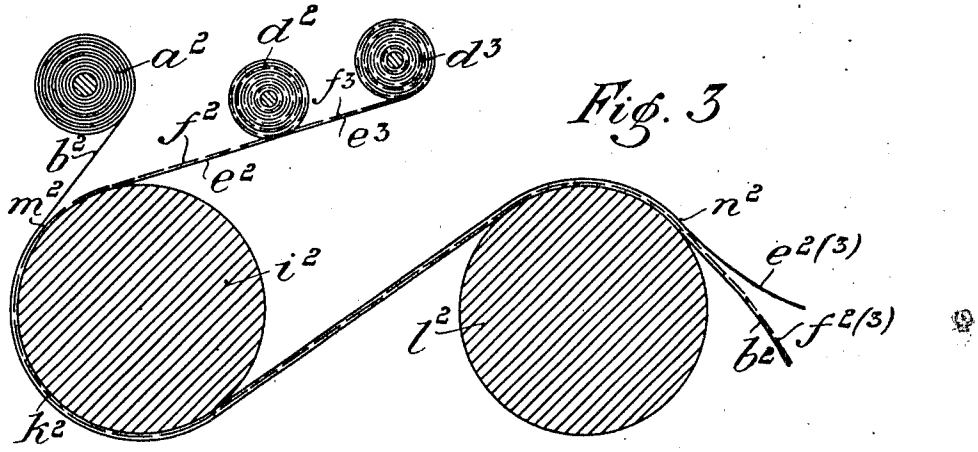



Fig. 3

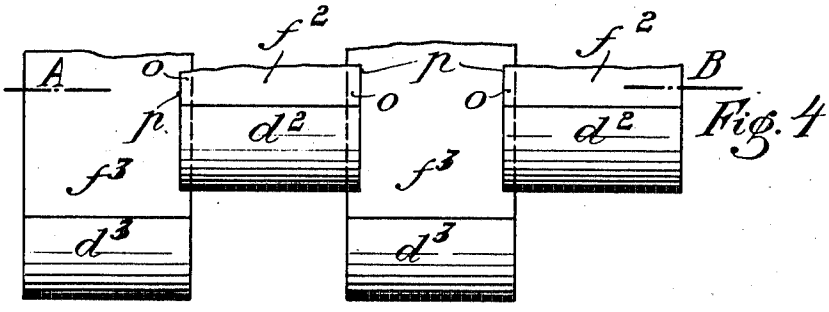



Fig. 4

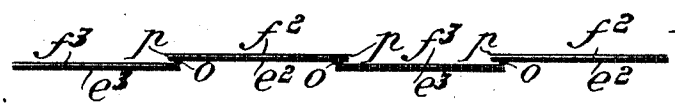



Fig. 5

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PROCESS OF COATING WEBS OF PAPER WITH LEAF METAL.

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1,096,822.

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2 SHEETS—SHEET 2.

Fig. 6

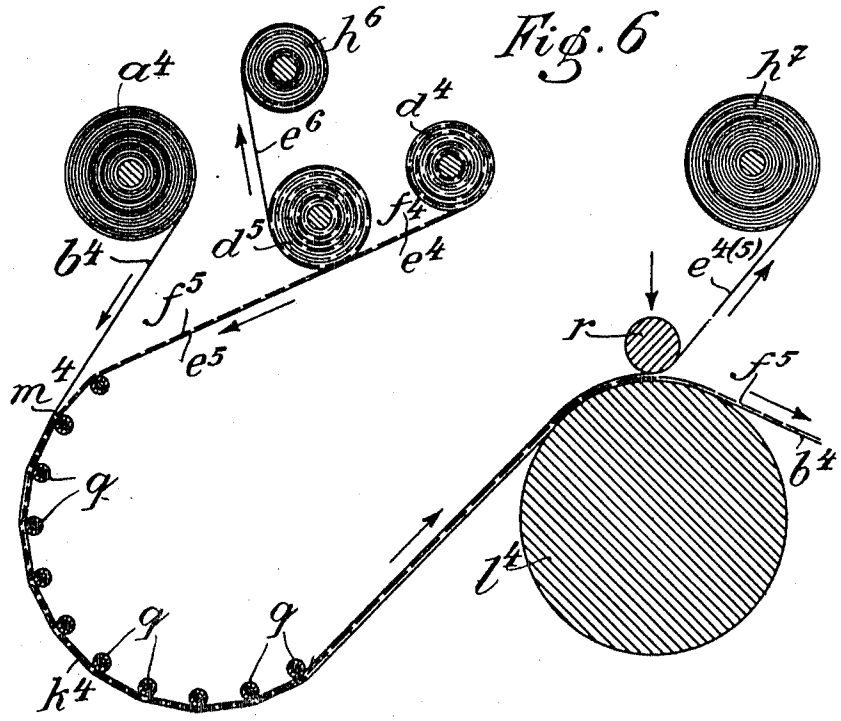



Fig. 7

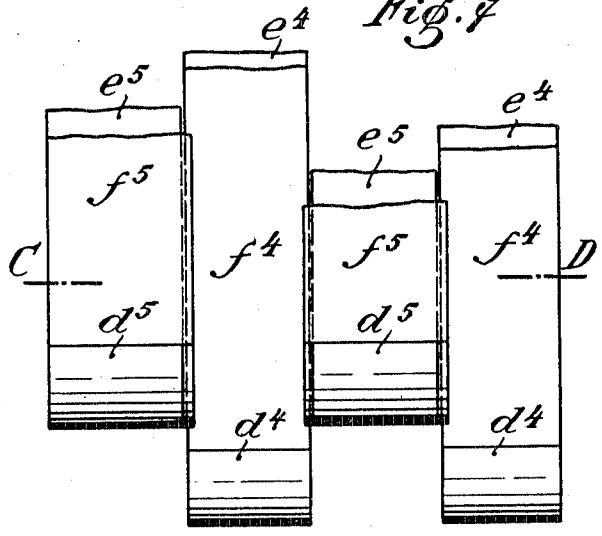
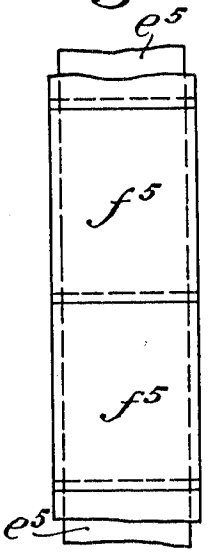



Fig. 9



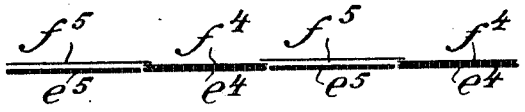




Fig. 8

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# UNITED STATES PATENT OFFICE.

EMIL BRANDT, OF MUNICH, GERMANY.

## PROCESS OF COATING WEBS OF PAPER WITH LEAF METAL.

1,096,822. Specification of Letters Patent. Patented May 19, 1914.

Application filed July 15, 1913. Serial No. 779,095.

*To all whom it may concern:*

Be it known that I, EMIL BRANDT, citizen of Germany, residing at Munich, Bavaria, Germany, have invented certain new and useful Improvements in the Process of Coating Webs of Paper with Leaf Metal; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

One known method of coating a strip of paper with leaf metal consists in winding the paper, with an adhesive substance thereon, together with a strip carrying the leaf metal, the leaf being pressed between the two strips by the tension applied in winding them. With this process it is only possible to feed the metal leaf from one roll, because if several feed rolls were placed side by side, in order to coat a wider strip or web of paper, creases would be too liable to be formed in the course of transferring the several strips of leaf metal to the strip of paper to be coated. Moreover, as the leaf is generally subjected to the action of a blower while being applied to the strip to be coated, the air current acting on one strip of leaf metal is liable to shift the strips at the sides thereof. The adhesive used must be one which dries quickly, and one which is not soluble in water, as the coated paper is used for cigarette tips. This necessitates the use of resinous adhesives and the like, and with these the coated paper cannot be given a high polish, because the adhesive is melted by the heat produced by the operation of polishing.

In another known process, a web of cigarette paper receives pieces of leaf metal at intervals from a traveling carrier, which takes a separate path after applying the leaf metal, no regulation of pressure being effected or attempted. With this process, only portions of the surface of the paper are coated with leaf metal, so that it is not in the full sense a process of producing metal-coated paper.

The object of the present invention is to enable wide and narrow webs of paper to be coated over their entire surface with leaf metal which is applied with regulatable pressure, and to which a high polish can be given if desired. To this end the web to be coated with leaf metal, and a traveling web carrying the leaf metal, are brought together under pressure, as for example between two rollers, the pressure being removed after the transfer of the leaf to the first-mentioned web, and the two webs then continuing their travel in separate paths. The amount of pressure applied may be regulated by regulating the period during which the two webs are subjected to the pressure. If the adhesive used is one which dries slowly and is soluble in water, a high polish can be applied to the coated paper, because such adhesives do not become soft in the course of the polishing process. The leaf metal can be very firmly attached, and the adhesive is not liable to penetrate through such small holes as sometimes occur in leaf metal.

Provided that the coated web is separated from the carrier web immediately after removal of the pressure, it will be clear that a plurality of leaf metal feed rolls may be used side by side, or one behind the other, each having a separate pressure roll, the several pressure rolls being arranged at the periphery of a larger roll for the web to be coated. Several strips of leaf metal can thus be placed side by side on a web, slightly overlapping each other to obviate gaps.

The invention is illustrated in the accompanying drawing, in which—

Figure 1 is a diagram illustrating one method of carrying the process into effect. Fig. 2 is a sectional diagram, illustrating another mode of operation, and Fig. 3 is a similar view, illustrating a third mode of operation; Fig. 4 is a mutilated plan view of the leaf metal rolls and webs shown in Fig. 3, and Fig. 5 is a section of the webs on the line A—B of Fig. 4. Fig. 6 is a sectional diagram illustrating another mode of operation, Fig. 7 being a mutilated plan view of the leaf metal rolls and webs, Fig. 8 a section of the webs on the line C—D of Fig. 7, and Fig. 9 a plan view of one of the webs.

Referring in the first instance to Fig. 1, *a* designates a roll of paper adapted to be coated with metal leaf, *b* designating the paper web which is drawn from this roll and is provided with an even coat of adhesive on the whole of its surface; the said web *b* passes around the roller *c* in the direction indicated by the arrow; *d* is a roll consisting of a strip of paper or the like *e* carrying the metal leaf *f*. The strip or carrying web *e* together with the leaf metal *f* travels around the rotating roller *g*, as in-

dicated by the arrows. Said roller $g$ is arranged to be pressed against the roller $c$, with regulatable pressure, and is connected to the roller $c$ by suitable gearing, so that as the two rollers are rotated the leaf metal is transferred to the web $b$ at the place of contact. The web $b$ thus coated may be fed to a drying apparatus and thereupon either wound onto a roller, cut into sheets or otherwise treated, while the web $e$ having transferred the leaf metal, is wound up on the roller $h$.

It will be apparent that it is possible to regulate the period during which those parts of the webs $b$ and $e$, $f$, which are brought together, remain in contact with each other; this can be done by making them travel together around a greater or less part of the circumference of one of the rollers $c$, $g$, with regulatable pressure. Two or more rolls $d$ may be arranged side by side, with a similar number of pressure rollers $g$ provided adjacent the periphery of the roller $c$.

The adhesive is preferably applied to the web $b$ beforehand, the web then being dried and rolled. The prepared web, with the dried adhesive thereon, is subsequently, before being coated with metal leaf, unrolled and passed through water, and then rolled up again while wet, so that the adhesive becomes active and is distributed in the form of an even film by the pressure applied in rolling. The web itself becomes uniformly saturated with moisture from both sides, so that when used after a few hours it travels smoothly, without creasing, over the roller $c$.

The above described mode of operation requires uniform saturation of the web $b$ with water, in order to obtain smooth and uniform coating of leaf metal. The quantity of adhesive applied is so regulated that the coated paper has the requisite flexibility when subsequently passing through the polishing machine.

In certain cases, for instance with thin or porous kinds of paper, the adhesive alone will suffice to completely saturate the paper with moisture. The described saturating process may also be used independently of the above described process of producing metal coated paper.

In the above described mode of operation the contact of the two webs is brought about by and between two rollers.

As the leaf metal is not in the form of a continuous strip but consists of a number of leaves arranged one behind the other on the paper backing, or carrier, it may occur that individual leaves become detached from the backing while passing over the roller, and may slide forward and become crumpled between the rollers, in which condition it is then applied to the paper strip to be coated, a portion of the latter remaining bare. In order to avoid this contingency, the web coated with the adhesive may be drawn with its coated side facing inward over a convex curved surface, the web or webs carrying the metal leaf being caused to travel between the said convex surface and the adhesive web, so that the leaf metal is pressed by the stretched webs against the adhesive surface. This arrangement not only obviates the above mentioned disadvantage but renders the use of toothed gearing and other transmission gear unnecessary. The movement of all the rollers and the control of this movement are effected solely by the pull of the web of paper coated with the metal leaf. The convex surface is preferably formed by a plurality of rollers arranged in a curve, this arrangement being better than a single large roller, inasmuch as it prevents the occurrence of creases even when coating wide webs. An arrangement working on this principle is shown diagrammatically in Fig. 2, in which $a^1$ designates the paper roll, and $b^1$ the web drawn therefrom to be coated with leaf metal $f^1$ drawn from a roll $d^1$ together with a carrier web $e^1$ of paper or the like. $i$ is a fixed or rotating roller, on the periphery $k$ of which the web of paper $b^1$ is brought into contact with the leaf metal. $l$ is a roller of large diameter, which draws off the coated web from the periphery $k$, and at the same time draws the webs $b^1$ and $e^1$ from their respective rolls. The roll $a^1$ is preferably provided with a suitable brake device in order to keep the paper and leaf metal webs at the proper tension when passing around the roller $i$. $h$ is the roll on which the carrier web $e^1$ is rewound.

The operation is as follows: The draw-off roller $l$ is rotated and by adhesion moves the wet, adhesive web $b^1$, pulling the said web off its roll $a^1$. The web $b^1$ passing around the roller $i$ with its adhesive side facing the latter, meets at $m$ the web $e^1$, with the leaf metal facing outward, so that the leaf metal is transferred to the adhesive side of the web $b^1$. The latter pulls the web $e^1$ with the leaf metal $f^1$ off the roll $d^1$ at the same speed as that at which it travels itself. While the webs are traveling over surface $k$ intimate, smooth and uniform connection of metal with paper is effected. The blank web $e^1$ leaves the coated web at $n$ and is wound on the roll $h$ for subsequent use, and the metal coated web is dried by any known drying apparatus, and rolled up for further treatment or use. The web $e^1$ prevents the metal leaf which it carries from being damaged by the surface $k$ and also enables very thin and wet paper to be coated, as it takes part of the tension.

The arrangement shown diagrammatically in Figs. 3, 4 and 5 is substantially similar to that shown in Fig. 2, but in this case there are two pairs of carrier webs $e^2$, $e^3$,

drawn from rolls $d^2$, $d^3$, with leaf metal $f^2$, $f^3$ thereon, the two rolls forming each pair lying coaxially side by side, and the rolls $d^3$ being set back, so that the webs can be made to overlap, as shown at $o$ in Figs. 4 and 5. The carrier webs with the leaf metal meet at $m^2$ the adhesive paper web $b^2$ drawn from the roll $a^2$, and then travel under the web $b^2$ over the surface $k^2$ of the roller $i^2$, and thence to the roller $l^2$. At $n^2$ the carrier web separates from the coated paper web $b^2$. On the surface $k^2$ of the roller $i^2$ the edges $p$ of the webs $e^2$, lying upon the leaf metal $f^3$ carried by the webs $e^3$, cut away the overlapped parts $o$ of this leaf, so that clean joints are made where the strips of leaf metal meet at the sides. Of course the material forming the webs $e^2$ must be thin but yet strong in order that the edges of these webs are capable of performing this cutting action.

In the arrangement shown in Figs. 6 to 9, the curved path $k^4$ for the webs is formed by a plurality of fixed or rotatable rollers $q$ arranged in an arc. The web of paper $b^4$ to be coated with metal leaf travels from a roll $a^4$ to $m^4$, and then over the rollers $q$ to a roller $l^4$. There are two rolls $d^4$ supplying carrier webs $e^4$, with metal leaf $f^4$ thereon. There are also two rolls $d^5$ supplying carrier webs $e^5$ with metal leaf $f^5$ thereon. The several carrier webs travel side by side, their edges practically meeting, and the strips of metal leaf $f^4$ are of the same width as the carriers $e^4$. The strips of metal leaf $f^5$ on the carrier $e^5$ are, however, wider than the said carriers, so that these strips overlap the strips $f^4$, as shown in Figs. 7 and 8. While wound on the rolls $d^5$ the strips $f^5$ are covered by protective strips $e^6$, which are of the same width as the strips of leaf metal $f^5$ and lie between the latter and the carrier webs $e^5$. In the course of unwinding, the strips $e^6$, which serve only for protection during packing, transport, storage etc., are wound up separately, as at $h^6$, and leave the leaf metal exposed for transfer to the web $b^4$.

Above the roller $l^4$ there is pressure roll $r$, weighted or acted on by springs, so that it bears on the carrier webs. After passing between this roll $r$ and the roller $l^4$ the carrier webs $e^4$, $e^5$ are wound up separately to form a roll $h^7$, and the coated web $b^4$ continues its travel in another direction.

In all forms of the invention, suitable means, such as the take-up roller $h$ illustrated in Figs. 1 and 2, is provided to wind up the carrier web after the metal leaf has been transferred to the adhesive web. The carrier web, after removal of the metal leaf therefrom is caused to travel in one direction by the roller $h$, while the adhesive web provided with the leaf is caused by manual or mechanical means to travel in a different direction, thus causing the carrier web to separate from the coated web.

What I claim as my invention and desire to secure by Letters Patent of the United States is—

1. The herein described process of applying metal leaf to a web, which process consists in simultaneously passing an adhesive web and a carrier having metal leaf thereon while in contact with each other about a platen surface, exerting pressure against said surface through tensioning of said carrier and said web whereby a continuing surface pressure is exerted upon said web and said carrier to insure application of said leaf to said web, and finally separating said carrier and said web after pressure thereon has ceased.

2. The herein described process of applying metal leaf to a web, which process consists in simultaneously passing an adhesive web and a plurality of carriers each provided with metal leaf thereon, while in contact with each other about a platen surface, exerting pressure against said surface through tensioning of said carriers and said web whereby a continuing surface pressure is exerted upon said web and said carriers to insure application of said metal leaf from all of said carriers to said web, and finally separating said carriers and said web after such pressure has ceased.

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

EMIL BRANDT.

Witnesses:
A. V. W. Cotter,
Richard Lemp.