

(No Model.)

J. JOWITT.

ROOFING FELT AND ITS MANUFACTURE.

No. 318,910.

Patented May 26, 1885.

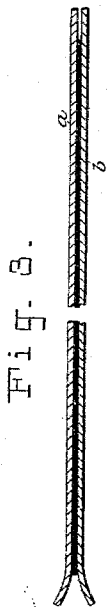
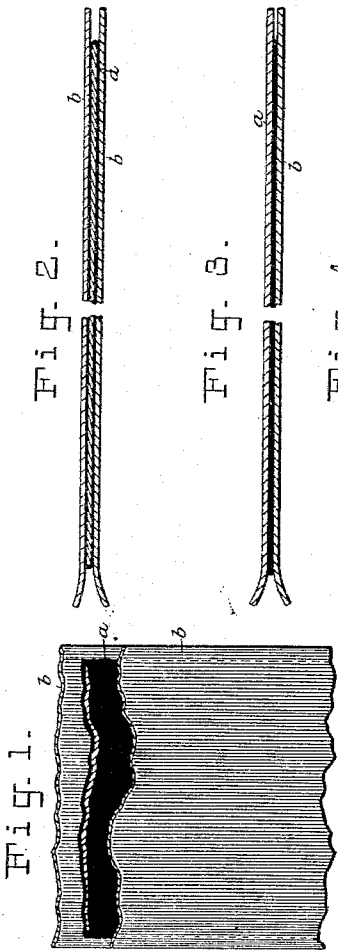


Fig. 4.

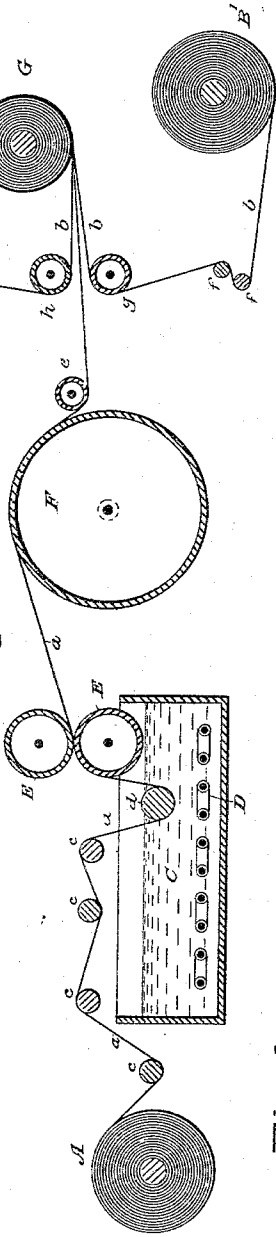


Fig. 5.

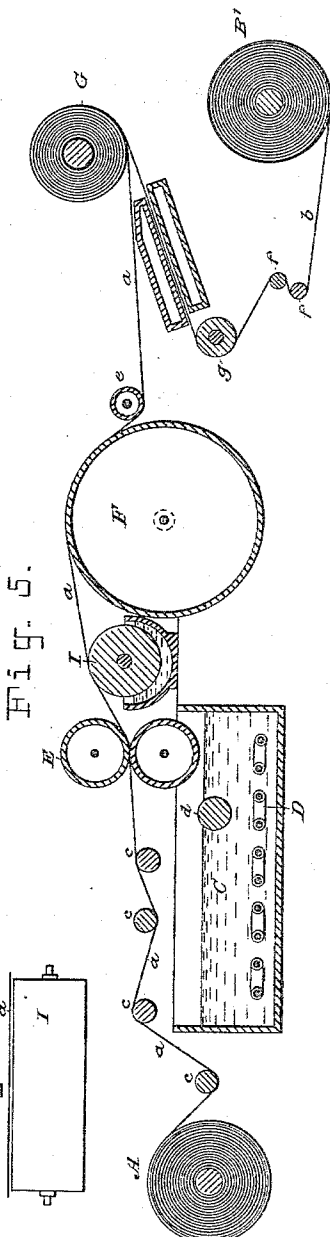
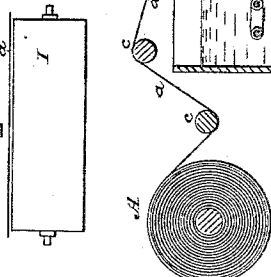


Fig. 6.



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# UNITED STATES PATENT OFFICE.

JOSIAH JOWITT, OF STANLEY, NEW JERSEY.

## ROOFING-FELT AND ITS MANUFACTURE.

SPECIFICATION forming part of Letters Patent No. 318,910, dated May 26, 1885.

Application filed April 2, 1883. (No model.) Patented in England July 25, 1882, No. 3,539, and in France January 24, 1883, No. 153,302.

*To all whom it may concern:*

Be it known that I, JOSIAH JOWITT, a citizen of the United States, residing at Stanley, in the county of Morris and State of New Jersey, have invented certain improvements in Roofing-Felts and their Manufacture, of which the following is a specification.

Roofing-felt as usually made consists of two or more, usually three, layers of felt-paper which have been separately saturated with coal-tar and dried, and are afterward coated with coal-tar pitch and pressed together. The layers are thus coated by passing them in extended webs through a tank of hot pitch. They are then passed between pressure-rolls to press them together and squeeze out the excess of pitch, and they are then cooled and dried, and finally wound up in a compact roll for the market. As all the layers are coated with the pitch, the contacting convolutions in the roll are liable to adhere together, particularly in warm weather when the pitch is softened by the heat, and when this occurs the material becomes practically valueless, because of the impossibility of unrolling it. To prevent this adherence of the superposed convolutions, various expedients have been devised for preventing their contact, such as rolling up a web of Manila paper with the roofing-felt, or sprinkling upon the felt some absorbent powder which is rolled up with it. These precautions are somewhat effective, but entail considerable expense and annoyance both in the manufacture and use of the felt.

The principal object of my invention is to produce a roofing-felt or other similar material which shall be in all respects equal to that heretofore made, and which shall be cheaper, more durable, and neater to handle, and which, above all, shall have a non-adhesive surface, so that the convolutions in the roll will not adhere together. To this end I make the felt with a dry outer surface, containing only enough tar or pitch to make it water-proof or weather-proof, and confine the heavier or cementing coating of tar or pitch to the interior of the felt between the surfaces which it serves to cement together; and I do not bring the intervening coating of cementing material entirely to the edge of the fabric, but by preference

I leave the layers uncemented along each edge, so that the pitch cannot ooze out at the edges of the fabric and cause the convolutions to adhere together in the roll at their edges.

My invention is applicable to roofing-felts and other similar fabrics, of two or more layers, the three-ply felt being that most used.

Figure 1 of the accompanying drawings is a plan view of a fragment of three-ply roofing-felt made according to my invention. Fig. 2 is an enlarged cross-section thereof. Fig. 3 is a cross-section of a two-ply felt made according to my invention. Fig. 4 is a diagram illustrating the process of making the three-ply felt by machinery. Fig. 5 is a similar diagram illustrating the process of making the two-ply felt; and Fig. 6 is a fragmentary view illustrating the latter process.

Referring to Figs. 1, 2, and 3, the black portion represents the coating of pitch or other adhesive substance by which the layers are cemented together, and the shaded portions denote the layers of paper or other fabric coated with tar or pitch and thoroughly dried previously to the layers being cemented together.

In Figs. 1 and 2, *a* is the inner or intermediate layer to which the adhesive coating has been applied, and *b b* are the outer layers. In Fig. 3, *a* is the layer to which the adhesive coating has been applied, and *b* is the layer which is thereby cemented to it.

I will first describe the process of saturating the layers before making them up into two or three ply felt, referring for that purpose to Fig. 4.

*A* is a roll of any suitable absorbent fabric, which is usually paper, such as felt-paper or hardware-paper. This roll is placed in suitable bearings where it will be free to revolve as the web *a a* of paper is drawn off from it. This web *a* passes successively under and over a number of pivoted dandy rolls or bars, *c c*, which may be more or fewer according to circumstances, their purpose being to impart a tension to the web so that it shall be kept taut.

*C* is a tank in which is placed the tar or other substance used as the saturating material.

rial to be applied to the web or layer *a*. This tar is heated and kept at the requisite temperature by a steam-coil, *D*, or by other suitable means. A roller, *d*, is immersed in the liquid in this tank, and a pair of pressure-rolls, *E E*, are arranged over the tank. The web *a* is carried down around the roller *d* and up between the rolls *E E*. These rolls are pressed powerfully together, are rotated by power, and are heated preferably by being made hollow and having steam admitted to their interiors. This pressure forces the tar into all the interstices of the fabric, and squeezes out whatever excess the web may have taken up, which drops back into the tank. The heat thus applied in connection with the pressure aids in causing the tar to thoroughly permeate the fabric, and to some extent volatilizes and expels the lighter and more volatile oils or other constituents of the tar. The web passes thence to and over a drying-cylinder, *F*, which is likewise heated, preferably by steam, which further dries the web by driving off the additional portion of the more volatile constituents of the tar. The web passes thence around a steam-roller, *e*, and extends to the winding-roll *G*, which is rotated by power and winds up the finished product.

I have shown but one cylinder *F*; but in practice two or more are used for this preliminary saturation.

The method of treating or saturating a single layer of felt-paper thus far described is substantially that claimed in the patent of George S. Page, granted July 20, 1880, No. 230,148. When a sufficient number of drying cylinders *F* is used, this method produces a tarred paper which is thoroughly dried or non-adhesive, but is nevertheless charged or saturated with a sufficiency of tar to impart to it all the water-proof or weather-proof qualities essential to good building or roofing paper.

In making my three-ply felt I take three rolls of the hot pressed and dried tar saturated paper thus produced and place one at *A* in Fig. 4, and the others at *B'* and *B''*. The web *a* from the roll *A* is carried through the machine in the manner already described. It is preferable to place coal-tar pitch in the tank *C* in place of tar, as it makes a more adhesive coating material. The web *b* from the roll *B'* is carried around rollers *f f*, which impart to it the necessary tension, thence around a roller, *g*, and thence to the winding-roll *G*. The web *b* from the roll *B''* is carried around a roller, *h*, and thence to the winding-roll *G*. The coating of pitch applied to the web *a* does not penetrate it to any great extent, because of its previous saturation with tar, but remains upon its surface, and is only partially dried by the rolls *E* and cylinder *F*. As the three webs are wound together upon the roll *G*, the adhesive coating of pitch on the web *a* causes the two outer webs, *b b*, to adhere to it, and when dried the three are strongly cemented together;

but the pitch is retained almost wholly in the spaces between the webs or layers and does not penetrate through the outer layers. Consequently the finished felt presents a dry and clean outer surface on both sides, and its convolutions do not adhere together in the roll even in the heat of summer. I thus make a fabric that is cleaner, neater to handle, and in many practical respects is superior to the product heretofore made, and which on being wound into rolls does not require the interposition of any separating sheets or powder.

The pitch is kept back from the edges of the completed fabric by using as the web *a* a roll of paper somewhat narrower than the webs *b b*. The latter are usually thirty-six inches wide, in which case the web *a* should be thirty-five inches wide, thus allowing an uncemented edge of a half-inch in width on each side of the felt. If in very warm weather the cementing coating of pitch should ooze out at the ends of the roll, it would remain in the space between the two layers *b b* and would cement these together, but could not under any conditions to which rolls of roofing-felt are ordinarily exposed exude in sufficient quantity to escape from the layers *b b*, and so cement the adjoining convolutions of felt to each other.

This method of making the roofing or building paper with an uncemented edge is not new with me, being described in the patent of A. Sackett, No. 278,278, dated May 22, 1883. Mr. Sackett is also, as I believe, the first inventor of the method of cementing two layers (shown in Fig. 3) by coating one layer with the cementing substance, but leaving it uncoated along both edges, and bringing its coated surface in contact with the other layer.

I have said that all three rolls, *A*, *B'*, and *B''*, are of previously saturated and dried fabric; but it is not essential that the intermediate layer, *a*, shall have been previously saturated, as untreated paper may be used as the web *a* with nearly as good results. In this case it becomes saturated with the pitch used as the coating material. Neither is it essential that the webs *b b* shall have been previously coated and wound into rolls, as the coating of these webs may be proceeding simultaneously with the making of the three-ply felt. To accomplish this, three machines may be operated simultaneously, two machines being occupied in coating the webs *b b*, and the saturated and dried webs being conducted thence to the third machine, which coats the inner web and unites the three together, it being, in fact, the machine shown in Fig. 4.

I have described pitch as the coating material used to cement the three layers together; but it is obvious that any suitable cement, varnish, or other adhesive material may be used.

I will now describe certain other and subsidiary features of my invention.

In making three-ply felt on the machine illustrated in my application No. 85,666, filed December 30, 1882, some difficulty has been

found, particularly in cold weather, in making the three layers adhere together with the requisite tenacity, owing to the cooling of the coating of pitch on the intermediate layer before it effected the cementing together of the three layers. I now remedy this defect by heating the outer layers before they come in contact with the inner one, so that they shall not chill the pitch when they touch it. The result is a much more perfect adhesion than when the outer layers are worked cold, and the heat of the inner layer is relied on to keep the pitch at an adhesive temperature. The inner layer may even cool considerably before meeting the outer ones without impairing their adhesion, although it is preferable to have all three of about the same warmth. I effect this heating of the outer layers or webs by making the rollers *g* and *h* hollow and passing steam through them. As the webs *b b* pass around these rollers they are heated to the requisite temperature.

Instead of passing the webs *b b* over steam-rollers they may be heated in other ways, as by lamps, stoves, or flues. In Fig. 4 a web is shown as heated by passing it between steam-boxes.

Another feature of my invention consists in a method for increasing the smoothness or uniformity of the coating of pitch which is applied to the web *a*. Heretofore the cylinder *F* and roller *e* have been caused to revolve at the same speed as the web. I now apply power to the cylinder *F* and cause it to revolve at a surface speed somewhat greater than that of the web. The proportion which I have adopted is that the cylinder shall move ten feet while the web travels nine feet; but this proportion may be varied greatly. The cylinder may even be caused to revolve more slowly than the web; but this is less desirable, because it increases the resistance to the movement of the web, whereas when the cylinder moves with an accelerated speed it aids in propelling the web. The result of thus causing the cylinder to travel at a different speed from the web of paper is to establish a sliding motion between the two, which wipes the coating of pitch and spreads it uniformly over the paper, and also prevents its adhering to the cylinder. I also fix the roller *e* so that it cannot revolve, or use in its place a fixed pipe or tube with a smooth and polished surface. This acts in similar manner to the accelerated cylinder by spreading lumps and ridges of pitch equally over the surface of the paper. By these means I produce roofing-felt of uniform thickness and without lumps or ridges.

Fig. 5 shows the method of making the two-ply felt shown in Fig. 3. The two webs *a* and *b* used for this felt are of equal width, and must both have been previously saturated, as the coated web is not immersed in the pitch. A tank, *H*, containing the pitch, is mounted between the rolls *E E* and the cylinder *F*, and in this freely turns a coating-roller, *I*. As the web *a* is drawn over this roller, the latter

revolves in the tank and takes up a coating of pitch, which it applies to the under side of the web *a*. As the roller *I* is of less length than the width of the fabric, as shown in Fig. 6, it leaves a narrow portion of the latter at each edge uncoated. The web *a* thus coated travels through the machine, as before described, and is unfitted to the web *b* from the roll *B'*, the coating of pitch coming between the two and cementing them together, except along each edge. The roll *B''* is omitted.

This method of coating the fabric in making two-ply felts is not in itself new with me, having been invented by Mr. A. Sackett, and embodied in his application for patent filed May 11, 1883, No. 94,646, and is shown by me merely to illustrate one application of my novel process of making weather-proof or saturated paper, hereinbefore described.

I claim as my invention—

1. A roofing-felt or similar fabric, composed of a roll of two or more extended strips or layers of tar-saturated paper, hot-pressed and dried, cemented together by a coating or coatings of pitch or other similar adhesive substance intervening between the layers of paper and not extending to the exterior surface of the fabric, whereby the latter is externally dry, non-adhesive, and cleanly, substantially as specified.

2. The improved process of making roofing-felt or other similar fabric, which consists in applying a coating of pitch or other suitable cementing substance to a web or layer of paper or other fabric, partially drying said web by passing it over heated surfaces, and finally rolling the same in contact with one or more webs or layers of fabric which have previously been saturated with water-proof material and dried, substantially as set forth.

3. The improved process of making roofing-felt or other similar fabric, which consists in applying a coating of pitch or other suitable cementing substance to a web or layer of paper or other fabric, passing said web between heated pressure-rolls, partially drying said web, and finally rolling it, while its coating of pitch is still adhesive, between two webs or layers of suitable fabric which have been previously saturated with waterproofing material and dried, substantially as set forth.

4. The improved process of making roofing-felt or other similar fabric, which consists in applying to a web of paper a coating of pitch, partially drying the same, by passing said web over heated surfaces, and finally rolling said web in contact with one or more webs or layers of fabric which has been previously saturated with tar and dried, and which is heated before coming in contact with said coated layer, whereby the thorough adherence of the layers is insured, substantially as set forth.

5. The improved process of making roofing-felt or other similar fabric, which consists in first coating a web or layer of paper with pitch; second, passing the said web so coated over a heated cylinder with its coated surface

against said cylinder, and causing the cylinder to travel at a surface speed different from said web, whereby the coating thereon is spread more uniformly thereover; and, finally, 5 uniting said web to one or more other webs, substantially as set forth.

6. The improved process of making roofing-felt or other similar fabric, which consists in passing a web of paper through a bath of hot 10 pitch, squeezing the same between rollers, passing it over a heated cylinder on one side, which rotates at a surface speed different from

the web and over a heated stationary roller or tube on the other side, whereby the coating on both sides thereof is spread more uniformly over it, and finally rolling it between two webs of uncoated material, substantially as set forth.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

JOSIAH JOWITT.

Witnesses:

ARTHUR C. FRASER,  
HENRY CONNETT.