

G. F. MANSBRIDGE.
FOILED PAPER AND METHOD OF PRODUCING SAME.
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920,970.

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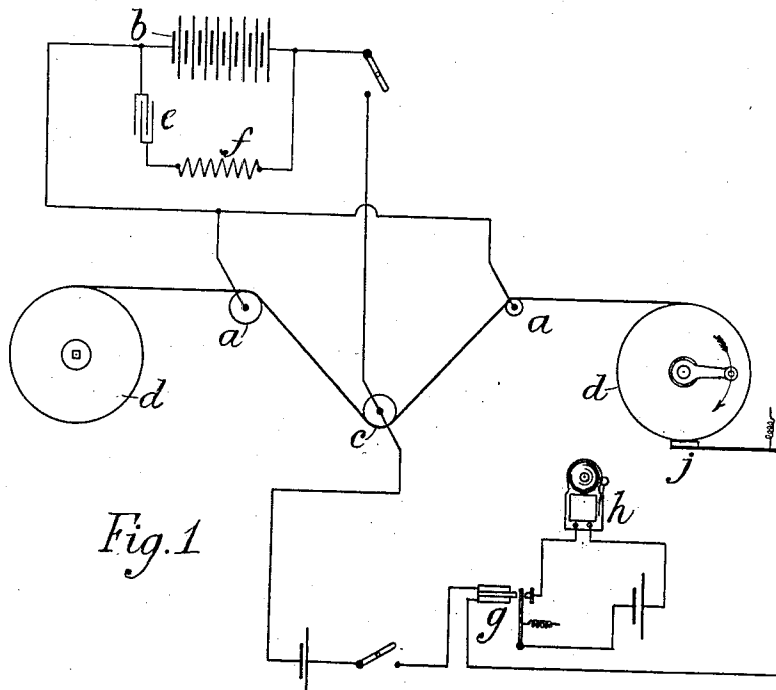


Fig. 1

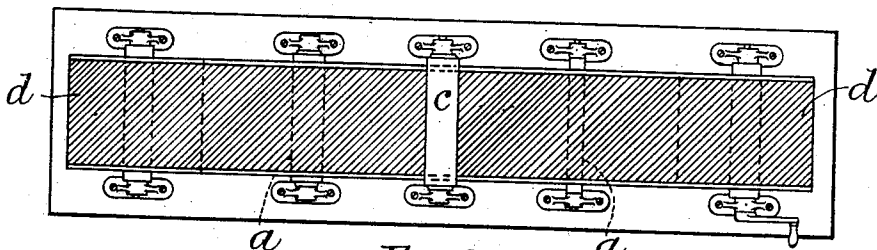


Fig. 2.

Witnesses:
Harry Y. P. Lee
Ernest C. Price

Inventor:
George Frederick Mansbridge

UNITED STATES PATENT OFFICE.

GEORGE FREDERICK MANSBRIDGE, OF SANDERSTEAD, ENGLAND.

FOILED PAPER AND METHOD OF PRODUCING SAME.

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To all whom it may concern:

Be it known that I, GEORGE F. MANSBRIDGE, subject of the King of Great Britain, residing at Sanderstead, England, have invented certain new and useful Improvements in Foiled Paper and Methods of Producing the Same, of which the following is a specification.

This invention has reference to foiled paper, foiled parchment and the like and it has for its object to improve the quality of such material so as to render the same more suitable for electrical purposes. By foiled paper or foiled-parchment I do not mean paper or parchment to which solid metal foil has been attached or applied but paper, parchment and the like coated with a thin film of metal which has been applied to the paper in the form of a powder or paste, and is integral with the paper, in the well known way. For the purposes of this invention the thin metallic film must be electrically continuous and conducting and must be firmly adherent to the paper. I improve the quality of the material by treating it, prior to use, in such a manner as more efficiently to insulate, in the case of material foiled, or coated, on both sides, the two conducting coatings from each other, and in the case of material foiled, or coated, on one side only, the foiled surface from the plain surface.

For convenience of description reference will hereinafter be made simply to "foiled paper" as describing the various materials to which this invention is applicable.

In the use of foiled paper for electrical purposes it is often desirable that the foiled surface shall be electrically conducting and continuous with respect only to that side of the paper on which it is situate, *i. e.*, in the case of paper foiled on one side only, that a sheet of metal—as tinfoil—placed in contact with the plain side shall be completely insulated, by the dielectric (the body paper), from the foiled side of the paper; similarly, in the case of paper foiled on both sides, that the two conducting surfaces shall be completely insulated from each other by the body paper. This desideratum is difficult to obtain, particularly with thin paper, since defective places in the dielectric, caused by weak spots or "pinholes" in the body paper, or by grains of metal being partially or completely driven through the paper in the process of manufacture, cannot be altogether

avoided. Consequently, when such paper is used for electrical purposes, *e. g.*, as a condenser, inductive resistance or the like, there is a tendency for the defective places to "break down" or to cause a "short circuit" when the dielectric is subjected to electrical pressure.

By means of my invention I produce an improved quality of foiled paper in which the defective places are relieved of part or all of the electrical strain which would otherwise come upon them when the dielectric was subjected to electrical pressure. By thus relieving the defective places from strain I, in effect, eliminate them altogether and I thus produce a paper from which more uniform and more satisfactory results can be obtained when the same is used for electrical purposes, *e. g.*, as a condenser, inductive resistance or the like. I attain this result by subjecting the foiled paper to a process which results in the conducting coating over the small area around and immediately adjacent to the defective places being removed or rendered non-conducting or practically non-conducting. This process consists in passing the foiled paper from end to end around, under, over or between conducting rollers, brushes or the like, one roller (or rollers) making contact with one side of the foiled paper, and being connected to one pole of a battery or its equivalent, and the other roller (rollers) making contact with the other side of the foiled paper, and being connected to the other pole of the battery, the two rollers (or two sets of rollers) being otherwise insulated from each other. Consequently when a defective place touches a roller which is in contact with the plain side of the paper, a current passes through the defective place either by direct conduction, if there is an existing pinhole, or by a disruptive discharge if the defective place is not strong enough to prevent puncture. This current is necessarily restricted at the point where it passes from one side of the paper to the other to a very small area, and in consequence the current density in that part of the metallic coating which is immediately adjacent to the defective place is great and a spark is momentarily produced. This burns away or otherwise renders non-conducting the metallic coating in the immediate neighborhood of the defective place but without burning away the body paper except to a very minute extent. Consequently the puncture is electrically isolated

and it is protected against subsequent breakdown since there is no longer a conducting path between the punctured spot and the surrounding coating. For the treatment of paper coated on both sides, the defective places may be similarly burned out, but as the foiled surfaces are continuous on both sides there is not the same necessity to use conducting brushes or rollers, although, for purposes of manipulation, it is convenient to use such brushes or rollers.

The mechanical device adopted for carrying out the treatment of the foiled paper may be of any simple kind, such as illustrated in the accompanying drawing which represents a convenient mechanical device for treating paper foiled on one side. In the said drawing which shows all that is material for the purpose of this description, Figure 1 is substantially a side elevation of the mechanical device showing also the foiled paper and a diagrammatic view of the electrical connections, Fig. 2 being a plan of said mechanical device and foiled paper.

Referring to the drawing, *a a* represent the insulated rollers, brushes or the like connected to one pole of the battery *b*, the insulated roller *c* being connected to the other pole and making contact with the foiled side of the paper; *d d* are the rolls of foiled paper, *e* is a capacity used to increase the current at the moment of short-circuiting, and *f* is a resistance used to prevent the condenser discharge taking place with too great suddenness.

Should it be necessary to detect and call attention to any want of continuity in the foiled surface, due to defective joints or other causes, it is convenient to use some such device as that shown in the lower part of Fig. 1, which comprises a low resistance relay *g*, a bell *h*, a conducting brush or roller *j*, and the necessary battery and connecting wires. As will be understood, the electrical circuit will be complete so long as there is continuity of the foiled surface between the roller *c* and the brush *j*. Should this continuity be broken, the armature of the relay *g* will be drawn back, thus com-

pleting another local circuit and ringing the bell *h*. I do not however restrict myself to the precise arrangement of the "breaking down" apparatus shown by the drawing, *e. g.*, only two rollers may be employed, one connected to each pole of the battery, but I prefer to use two rollers in contact with the plain side of the paper in order to provide additional security. Obviously, three or more such rollers may be used if desired. Further, the condenser *e* and the resistance *f* may be dispensed with, but it is then necessary to use a higher voltage between the rollers to produce an equivalent result.

The value of the voltage (and of the capacity and resistance when such are used) required to give the best results in any particular case can readily be determined by experiment, due regard being had to the conditions under which the finished product is to be used. In choosing or adjusting the values of the voltage, capacity and resistance, regard should be had to the fact that the best result may be expected when the puncture produced is small and clean and when the conducting material is well cleared away from the immediate neighborhood of the puncture.

Claims.

1. The hereindescribed method of treating sheets of paper coated with a thin film of powdered metal so as to avoid the detrimental effects of defective places therein when used for electric purposes which consists in subjecting each sheet separately to electric currents whereby the metal in proximity to any defective places in the sheet is fused and the defective places isolated, substantially as described.

2. As an article of manufacture, a sheet of paper coated with a thin film of powdered metal for electrical purposes having the defective places in the paper isolated from the metal or foil, substantially as described.

GEORGE FREDERICK MANSBRIDGE.

Witnesses:

H. D. JAMESON,
F. L. RAND.