

May 1, 1934.

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1,956,579

ADHESIVE TAPE

Filed July 23, 1930

*Fig. 1.*



*Fig. 2.*

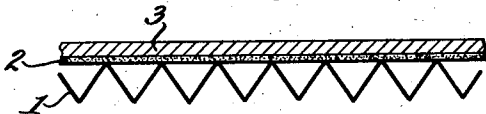


*Fig. 3.*

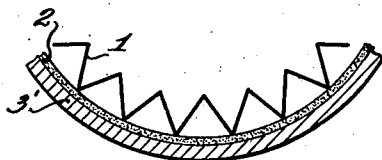
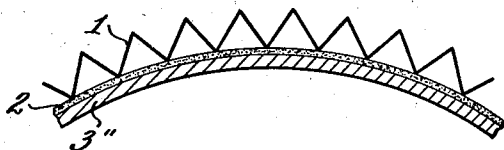


*Fig. 4.*



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## UNITED STATES PATENT OFFICE

1,956,579

## ADHESIVE TAPE

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Application July 23, 1930, Serial No. 469,976

5 Claims. (Cl. 154—43)

This invention relates to a method of and composition for coating flexible surfaces to provide a tacky, non-hardening adhesive sheet, and to the resulting products.

In various industrial operations it is desirable adhesively to apply one surface to another so that the surfaces shall adhere firmly and resist direct separation but may nevertheless be parted subsequently without leaving adherent patches of the adhesive upon the attached surface.

For example, in glazing and in decorative painting it is frequently necessary to apply paint or other covering liquids to certain prescribed parts of an irregularly shaped surface and at the same time to prevent the liquid from spreading or spattering upon adjacent areas. This is accomplished by applying to the surfaces to be protected an adhesive strip of paper (preferably with its edge adjacent to and defining the surface to be painted) before commencing the painting operation, and removing the strip of paper when the painting operation is finished.

The paper heretofore available for such purposes, however, has lacked flexibility, strength, or adhesiveness and hence has not been applicable to irregular surfaces. It is also subject to hardening with age, losing both flexibility and adhesiveness, so that in a short while it is no longer usable. The adhesives used have also become more or less permanently adhesive upon standing so that if the paper is rolled upon itself or piled up, the sheets stick together or "block" and can not be again separated for use.

It is accordingly an object of the present invention to produce an adhesive tape for such purposes, which is sufficiently tacky to adhere immediately to solid surfaces generally, which may freely follow the contours of the surface and conform thereto, accurately and snugly, which may be removed easily and completely therefrom and which may be rolled up without gumming or "blocking" into a hard mass.

It is also an object that the product shall not harden or otherwise deteriorate with age but shall be elastic so that it may be compressed or stretched without danger of breakage or loss of tenacious adhesion to the surface and still return substantially to its original dimensions and shape. Other objects will be manifest from the following disclosure.

In accordance with the present invention, it is found that an especially satisfactory adhesive tape for the purposes above described may be prepared by creping a sheet of paper in one or more directions (e. g. transversely and longi-

tudinally) and coating the creped sheet with a plastic, tacky, non-hardening composition containing a coagulated latex such as balata, etc., or rubber, or both and a plasticizing agent.

The usual crepe paper, which is typically stretchable longitudinally of the sheet (and may also be rendered stretchable transversely as indicated above) is entirely satisfactory for the purpose. However, it is preferable to employ a paper of relatively tough fiber, so that the finished sheet shall have considerable strength. At the same time, it is desirable that the creped sheet shall be soft and flexible, have a fine degree of creplings, and, when extended, that it shall be appreciably longer than the unstretched, creped sheet,—in other words, have a high crepe ratio.

To this end, it is found especially effective to employ a sheet of tough fibered paper, which may be parchmentized on one side and characterized by having a fine crepe, as described in our copending application Serial No. 469,977, filed July 23, 1930, Patent 1,871,702, August 16, 1932, for example. Such a sheet is not only soft and flexible but is capable of acquiring and retaining a high crepe ratio and hence a high degree of elasticity. The unparchmentized surface may be uniformly coated with a thin layer, and hence a minimum quantity of the adhesive composition while the parchmentized surface is substantially repellant, so that the coated sheets may be piled or rolled up freely, without "blocking".

The coating composition is characterized by containing coagulated latex such as balata, or rubber,—or both,—and may advantageously be susceptible of partial vulcanization. In the latter case, however, continued or complete vulcanization,—to such extent as would deleteriously affect the tackiness or adhesive properties of the composition,—is to be avoided. This may be effected by the addition of vulcanizing agents and antioxidants, respectively, and also by the addition of plasticizers.

An example of the practical application of the invention will be described with reference to crepe paper as a backing material and an elastic coagulated latex composition of balata and rubber as the adhesive. Such a sheet is illustrated in the accompanying drawing in which,

Fig. 1 represents a cross section of a sheet of creped paper 1, of high crepe ratio, having a layer 2 of a tacky elastic coating composition thereon; and

Fig. 2 represents a cross-section of the same

in greatly extended condition, on a solid surface 3;

Fig. 3 is a similar view, in respect of a concave surface 3';

5 Fig. 4 is a similar view, in respect of a convex surface 3''.

A sheet of kraft paper of medium weight may be made according to usual procedures of paper making but preferably with a water-struck or finished surface on one side, the other side being relatively rough or fibrous. The smooth side may also be formed by parchmentizing, as by passing the sheet between rollers, one of which dips into a solution of sulfuric acid, allowing the acid to react thereon for a brief period—and then washing. The paper is then rendered sensibly dry and creped in accordance with customary practices, preferably to produce a fine degree of creping and also a high crepe ratio, as by applying an adhesive or creping solution to the smooth surface, if necessary, passing over a creping roll, and creping and removing the sheet by a suitable doctor knife. The degree or type of creping may be fine or coarse and with high or low crepe ratio as desired, which is effected by appropriate adjustment of the creping operation as is well known in the art of creping paper. However, a fine crepe, having a smooth, uniform surface and a high degree of flexibility and elasticity or high crepe ratio is to be preferred. The paper may then be embossed or calendered, dried, and wound up into rolls.

The adhesive rubber coating composition is then prepared and may contain the following, for example:

|                                  |     |
|----------------------------------|-----|
| Medium up river Pará rubber..... | 100 |
| Balata gum.....                  | 7   |
| Burgundy or elastic pitch.....   | 7   |
| 40 Whiting.....                  | 60  |
| Naphtha.....                     | 300 |

The rubber should be intensively milled to develop tackiness therein,—on, or two hours being preferable.

45 A somewhat more elastic or cohesive composition may be obtained by compounding the rubber materials with a small amount of vulcanizing reagents,—and preferably also a small amount of anti-oxidant.

50 For example, the composition may be prepared in separate batches,—one containing the vulcanization accelerator and the anti-oxidant, while the other contains the vulcanizing reagents,—milling them thoroughly,—and finally mixing the two compositions when ready to be applied.

| A                                                                                    | B   |
|--------------------------------------------------------------------------------------|-----|
| 100 Rubber (Pará med.).....                                                          | 100 |
| 10 Zinc oxide.....                                                                   | 10  |
| 60 22 H rosin.....                                                                   | 22  |
| 60 Whiting.....                                                                      | 60  |
| 2 Condensation of acetaldol with alpha naphthylamine (age resistant or anti-oxidant) |     |
| 8 Balata.....                                                                        | 8   |
| 65 2 Zinc salt of dimethyl—dithio—carbamic acid (accelerator)                        |     |
| Sulphur.....                                                                         | 2   |

70 If for any reason the milling of the separate compositions is reduced, the grade of rubber increased or the content of resins is less,—the loss of tackiness or cohesiveness occasioned thereby may be materially offset or overcome by increasing the proportions of elastic pitch, rosin, pine tar or other rubber softeners.

It will be further understood that the grade of ingredients may be varied if the compounding is varied, and still obtain essentially the same result. For example, Guayule may be substituted for Pará if the resin is reduced. This is because Guayule has a higher resin content than Pará.

The adhesive composition is then spread upon the sheet of crepe paper by means of the usual rubber spreader or by passing through calenders and applying as a preformed, continuous thin sheet,—the composition in either case adhering firmly and tenaciously to and between the ridges of the creped paper surface,—preferably on the roughened surface which affords a greater and more intimate contact surface for the adhesive composition and which consequently retains the same more firmly. For example about fifty pounds of the adhesive mixture may be applied to a ream of paper (basis 20 X 25—500). The sheet is then dried (e. g. for 5 minutes at 160° F., which has proven sufficient) and may then be wound into rolls. It is found that the finished, uncoated surface of the sheet, upon coming into contact with the coated surface, even under pressure, or upon being subsequently subjected to storage, etc., does not become permanently or seriously joined thereto, but may be unrolled freely and completely.

By crinkling or embossing the paper transversely of the first creping (before applying the adhesive) it is found that the sheet is rendered more flexible and is readily applicable to curved surfaces,—and especially to areas which are curved in two dimensions. This may be further enhanced by the addition of fluid softening agents such as glycerine.

The finished, coated sheet may be cut into sizes and lengths, as desired, stored and shipped in rolls, etc., as desired, and when it is to be used, unrolled in such quantity as required. In use, the strip is laid smoothly and firmly upon the surface to be covered and adheres thereto immediately and in intimate adhesive contact therewith. When used as painter's tape, for example, the margin of the paper serves as a guide for the paint (or other liquid to be applied) and the latter will not creep underneath the flat lying edge of the paper. Neither will water soften nor loosen it, and it will be as tight around edges and over irregular contours as upon the flat surfaces without manifesting any tendency to dry or harden or to leave the surface when once attached thereto.

When the work is finished, however, the tape may be stripped from the surface by folding back sharply and "peeling" it off—when it separates easily and completely and may be again rolled up and is suitable for re-use. Other applications of the method and product will occur to those employing the invention, and such applications and adaptations are to be considered as comprehended by the present disclosure and included by the following claims.

We claim:

1. A non-hardening adhesive sheet, comprising a sheet of crepe paper having an unfinished surface and a parchmentized surface and a tacky coating of rubber upon the unfinished surface.

2. A roll of non-hardening adhesive tape comprising a sheet of crepe paper of high crepe ratio having an unfinished surface with a tacky coating containing rubber thereon and a finished surface resistant to such adhesive so that the tape may be readily unrolled.

3. A non-hardening adhesive sheet, comprising a sheet of crepe paper of high crepe ratio having an unfinished surface and a parchmentized sur-

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face and a tacky coating of rubber upon the unfinished surface.

4. A non-hardening adhesive sheet, comprising a sheet of crepe paper of high crepe ratio having an unfinished surface and a parchmentized surface and a tacky coating of partially vulcanized rubber upon the unfinished surface.

5. A non-hardening adhesive sheet, comprising a sheet of crepe paper having an unfinished surface and a parchmentized surface and a tacky coating of partially vulcanized rubber upon the unfinished surface.

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ROBERT F. CHARLES.

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