Nov. 5, 1946. A. J. WARTHA 2,410,472

SANDBLAST STENCIL

Filed Jan. 11, 1940

Fig. 1.

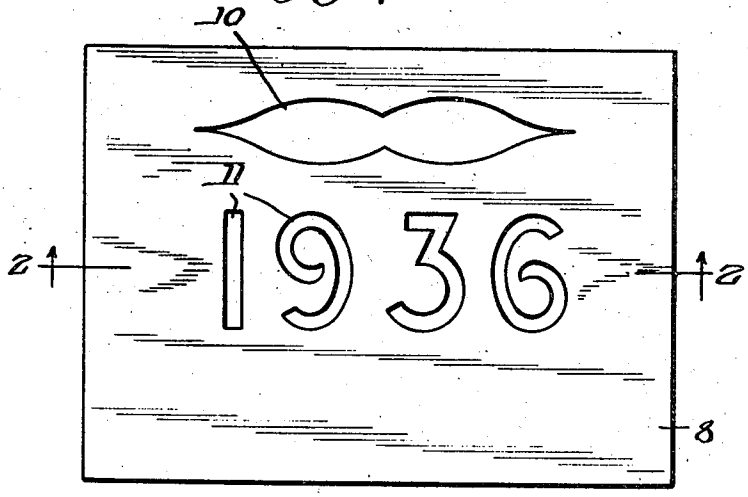


Fig. 2.

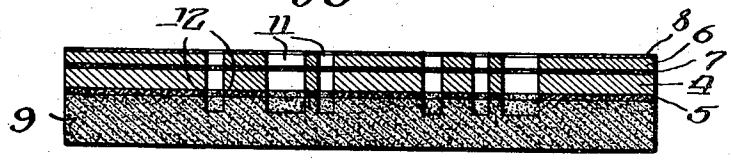


Fig. 3.

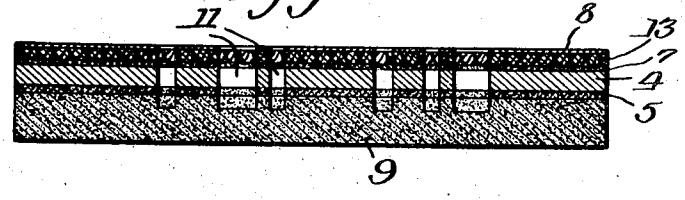
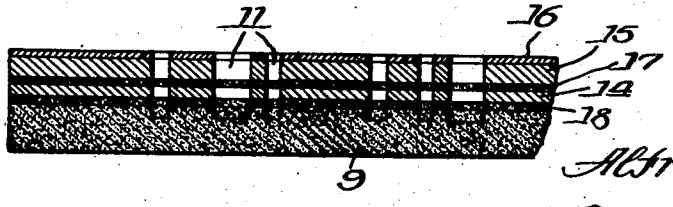


Fig. 4.



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SANDBLAST STENCIL

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Application January 11, 1940, Serial No. 313,370

23 Claims. (Cl. 41—39)

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This invention relates in general to sheet materials and more particularly to improvements in such sheeted materials as described in my applications Serial No. 358,443, filed September 26, 1940, and issued to Patent No. 2,251,647 on August 5, 1941, Serial No. 275,595, filed May 25, 1939, and Serial No. 275,596, filed May 25, 1939, issued to Patent No. 2,251,646 on August 5, 1941, wherein the sheeting is of a nature to be inherently resistant to abrasion, such as it would be subjected to when used as a stencil for sandblasting operations, and especially to such materials provided with an adhesive coating which is also characterized by resistance to abrasion and is desirably of a pressure-sensitive nature. Furthermore, the adhesive is preferably water-insoluble and normally non-drying. While the invention is described and claimed with respect to a sheet material particularly adapted for use in making stencils, it will be understood that the sheeting may be employed for other purposes, and the invention therefore finds a wide field of utility.

The invention has special utility as stencil material for limiting the application of fluid in the form of spray or otherwise, and also for limiting the area of a given surface exposed to the action of sand particles in a sandblasting operation, it being understood, however, that such limited fields of specific use are cited merely for purposes of illustration as examples of the utility of the invention in its several phases. A prime requisite of stencil material to be used in inscribing stones, such as granite or marble, by sandblasting, is that it must be sufficiently strong and resilient to resist abrasion by a stream under an air pressure of 100 pounds. It must be flexible to conform to extremely uneven surfaces on which it may be applied. It must be tough enough to withstand abrasion and yet it must be capable of being readily and accurately cut to form a stencil aperture of an intricate design. It must adhere to the surface to be inscribed firmly enough to prevent its displacement during the sandblasting operation and yet not so strongly as to injure the surface or cause adhesion thereto of particles of the stone surface upon its removal. The principal object of the invention is to provide a sheet composition having the foregoing highly desirable qualities. A further important object of the invention is the provision of sheet material of the character described which can be produced relatively easily and inexpensively.

One of the principal objects of the present invention is to provide sheet material adapted for making stencils for use in the stone engraving industry where sandblasting operations are used,

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and characterized by a tough, flexible, blasting-resistant backing coated on one surface with a blasting-resistant liner adapted to take pencil and carbon impressions and be permanently retained thereon and on its opposite side with an adhesive having blast-resistant properties and which is of a pressure-sensitive nature adapted to retain the backing material on the surface of the stone to which it is applied to a degree sufficient to resist any action of the sandblast to remove the same, but at the same time permitting the stencil sheet to be readily removed when desired without defacing the stone surface in any way.

Other objects and advantages of the present invention reside in the provision of a stenciling sheet which possesses unusual durability under the high pressures employed in pressure blasting; the provision of an improved adhesively coated stencilable sheet in which quick application of the same to a desired surface, including a cold surface, may be made in any kind of weather; the provision of a stencilable sheet and adhesive therefor in which the adhesive and the sheet are non-hardening and in which the adhesive is pressure-sensitive; the provision of an improved form of stencil sheet which permits, in high-pressure sandblasting methods, of highly accurate work by the operator and to permit the operator to do what is known as fine edge or shape carving; the provision of an improved form of stencil sheet in which the adhesive employed possesses a high degree of tenacity for the surface to which it is applied, thus preventing the stencil from leaving the stone while blasting and, at the same time, in which the adhesive will not offset onto the softer stones or pull away particles of the stone when it is removed therefrom.

The invention is disclosed in two principal embodiments, each of which is characterized by the provision of several laminations having a backing capable of readily receiving and retaining marking, such as are used as transfers in the monument trade or a design drawn with an ordinary lead pencil; and in which such a stencil sheet may be employed as a substitute for so-called offset blanks employed by lithographers. In one embodiment, the layer of highly blast-resistant material is coated on one side with an adhesive adapted to be attached to the stone or other article to be inscribed, and on the other surface an adhesive to which is secured a layer of treated paper or cloth which has a back sizing capable of readily receiving and retaining marking. The other embodiment is somewhat similar, and one surface of the highly blast-resistant layer is provided with the back sizing capable of receiving

and retaining marking and the other surface with an adhesive to which is secured a layer comprising "Troya tissue" or a thin cellulosic layer having similar properties coated with an adhesive adapted to secure the composite to a stone or other surface to be inscribed. Removable liners of parchmentized paper and starched Holland cloth to protect the adhesive coating while the sheet is in roll form are disclosed in my copending applications previously referred to. The present invention represents an improvement over these constructions in that the difficulty of removing parchmentized paper liners and Holland cloth liners from the adhesive is eliminated. The provision of a permanently secured liner permits the usage of a thinner stencil sheet backing than in previous sandblast stencil sheets known to the art without loss of blast-resistant properties.

The invention wil be readily understood from the following description in conjunction with the accompanying drawing wherein certain preferred embodiments are shown, in which:

Fig. 1 is a plan view of the stencil sheet material with apertures cut therein to provide a design;

Fig. 2, an enlarged sectional view taken along the lines 2—2 of Fig. 1 and showing the improved stencil sheet material provided with apertures secured to a slab;

Fig. 3, an enlarged sectional view of a modified form of the stencil sheet secured to a slab;

Fig. 4, an enlarged sectional view of a further modified form of the stencil sheet secured to a slab.

A satisfactory construction, shown in Figs. 1–3, embodying the foregoing highly desirable results may be obtained by employing a composite backing including a layer which may be termed a compounded rubber sheet or a rubber composition sheet which may or may not contain fibrous material and which may or may not be vulcanized and which has applied to one surface thereof a pressure-sensitive adhesive, this adhesive being conveniently of the water-insoluble unified type compatible with the backing so as to have greater adhesion for the backing than for a surface to which the stencil may be applied. To the opposite surface of the rubber sheet in this embodiment is applied a treated sheeting preferably of cellulosic material having a coating capable of taking pencil and ink impressions by transfer and not adapted to offset adhesive thereon when rolled.

In the other embodiment shown in Fig. 4, likewise of a laminated construction, the coating adapted to receive impressions is applied as a backsizing to the rubber composition sheet.

In all of the embodiments, the rubber compounded backing sheet is conveniently made up from a rubber compound including rubber such as latex crepe, which may be vulcanized, whiting, bone glue siftings, Solros, factice and beta naphthol with or without fibrous material. In this composition the writing provides a finely divided base material which is bonded together to form a coherent mass by the rubber. Other comminuted base materials, such as Dixie clay, soapstone and the like, may be employed instead of writing, in whole or in part. The bone glue siftings are a convenient form of finely divided glue which serves as a bodying ingredient in addition to the whiting, and also gives firmness to the composite sheet which enhances the ease and accuracy of cutting apertures in the sheet to form the stencil. The glue, Solros and beta naphthol may be omitted if desired, but the most satisfactory results have been obtained in following the formula as herein set forth.

Factice is a vulcanized or blown oil which mixes evenly with the rubber to increase the homogeneity of the mass and also serves to reduce the nerve of the rubber. This latter function is important in that the ordinary characteristics of rubber as to toughness and elasticity are not desirable in this composite sheet as they would cause the sheet to be difficult to cut accurately to the desired design. Vulcanized vegetable oils (factice) have been found to be particularly suitable for this purpose. For example, such vegetable oils as vulcanized linseed oil, tung oil, cottonseed oil, corn oil, and sunflower seed oil have been found to be satisfactory. The reduction of the nerve of the rubber is further accomplished by the intensive milling in the preparation of the composite material as hereafter disclosed. Solros is a heat-treated wood rosin used in this composition as a tempering agent particularly during the milling process. Other rosins may be employed and mineral oils may be employed, in whole or in part, to replace the vulcanized vegetable oils. Beta naphthol is an antioxidant used to prolong the life of both the rubber and the glue of this composition.

The fibrous filler, when used, is preferably of a nature which permits of free cutting of the material, as cotton linters, paper fibre, wood fibre, grass fibre, or mixtures thereof, and the like.

For vulcanizing the compounded sheeting, if desired, such agents as commonly used for that purpose may be utilized, viz., for example, sulphur or sulphur-bearing agents as dipentamethylenethiuramtetrasulfide, selenium, m-dinitrobenzene, and the like, with or without the inclusion of an accelerator, as, for example, di- and triphenylguanidine, tetramethylthiuram and piperidine derivatives.

While the proportions of these ingredients may be varied within reasonable limits, I have found proportions by weight according to the following formula to give a desirable composite sheet material:

FORMULA A

	Parts
Bone glue siftings	1
Latex crepe rubber	1
Whiting	3
Solros	.045
Factice	.25
Beta naphthol	.01

For my purposes it is preferred to place the rubber in a mill and then mill it until the mass follows the mill roll and gives the appearance of a smooth film covering the roll . This takes approximately ten minutes of milling time.

The bone glue siftings are then added and the rubber and glue, in substantially equal amounts, milled for approximately thirty minutes. From time to time the mass may be treated with steam applied directly thereto, thus moistening the glue content and causing the same to more rapidly melt into and mix with the rubber.

I then mix thoroughly together the factice, whiting, Solros and beta naphthol and when well mixed they are added to the rubber-glue mass. This mass is then milled under steam application until the entire batch is thoroughly homogenized.

When the composite mass made according to the above formula has been thoroughly mixed, it

is then sheeted or calendered to form a sheet of the desired thickness, which, for example, may be approximately .035 inch. This sheet is then allowed to cool for approximately 24 hours to impart firmness thereto.

While the above composition expressed in proportionate parts is preferred, I have found that I may vary the ingredients to the following extent and obtain a workable sheeting:

	Parts
Bone glue siftings	10 to 25
Rubber content	10 to 40
Whiting	30 to 75
Rosin	.45 to 1
Factice	2.50 to 20

with no variation in the aging inhibitor. When desired, there may be added fibrous material in proportions varying from .5 to 80 parts and/or in either case the compounded material may be vulcanized in a manner well known in the art.

To make a fibrous type sheeting or compounded material of the nature as herein described, after obtaining a homogenized mass by compounding the material of Formula A, fibrous material in the form of cotton linters, either dry or moistened, for example, is slowly added to the mass, preferably in the proportion of 1 part fibre to 2 parts compounded mass and milled or mixed until thoroughly incorporated therein, as fully described in my copending application Ser. No. 275,595, filed May 25, 1939. This proportion of fibre preferably is the maximum desired, and I have found that for some purposes as in blasting glass, where sheetings of .011 inch in thickness may be used, the fibre content may be reduced to fractional parts and satisfactory results obtained.

When the compounded mass of the above formula A and fibrous material have become thoroughly mixed, it is then sheeted, as by calendering, to form a sheet of the desired thickness, which, for example, may be approximately .035 inch. This sheet may then be allowed to cool for approximately 24 hours to impart firmness thereto.

In order to obtain a vulcanized rubber sheeting, the compounded material may have vulcanizing agents and accelerators included by mixing them into the mass during its compounding, or the sheeting may be treated with vulcanizing agents, as described in my copending application, Ser. No. 275,596, filed May 25, 1939, issued to Patent No. 2,251,646 on August 5, 1941. For example, after cooling, the sheeted material may be treated with a vulcanizing solution comprised of one part sulfur chloride contained in 8 parts hydrocarbon liquid with which the sulfur chloride is miscible, as benzol or the like. Preferably, to apply the vulcanizing solution, the compounded sheeting is laid out and a coating of sulfur chloride is brushed or sprayed onto its exposed surface and allowed to stand until vulcanized. However, I may immerse or subject both surfaces to the solution to obtain a faster and more thorough vulcanization upon evaporation of the solvent and reaction of the sulfur chloride, with a vulcanizable material contained in the composite sheeting.

Alternatively, when a compounded backing completely vulcanized is preferred, I incorporate, for example, with the Formula A, following its compounding, stock curing or vulcanizing materials of the following character expressed in proportionate parts by weight based on 100 parts

rubber as contained in the aforementioned formula:

	Parts
Zinc oxide	5
Stearic acid	3
Sulfur	3
Accelerator "D. P. G." (diphenylguanidine)	1

mixed by milling with the compound of Formula A for approximately 30 minutes and sheeted and vulcanized at 250° F. for two hours. In addition, the vulcanized sheet material may be a composition mixed in the following proportionate parts:

	Parts
Formula A	530
Zinc oxide	25
"D. P. G." accelerator	1
Sulphur	4

which may be mixed by milling for approximately 30 minutes, then sheeting it and vulcanizing it at 250° F. for approximately six hours, or for longer periods of time at lower temperatures.

As a substitute for the vulcanizing agents expressed above, I may use a sulfur bearing compound, such as "Tetrone A" (dipentamethylenethiuramtetrasulfide), or the like, milled directly into the compounded plastic stock with subsequent sheeting and vulcanizing at a temperature of approximately 250° F. for a period of two hours.

The antioxidant, vulcanizing agents and their accelerators as expressed are illustrative examples, and it is to be understood that other similar materials may be substituted by proper selection of such agents well known to the art.

The composite materials heretofore described may be sheeted, as by calendering, to any thickness desired, as, for example, for some stenciling purposes the thickness may be .035 inch more or less, but for other purposes, as taping or the like and including stenciling, the compound may be sheeted to .022 inch thickness, more or less, as desired.

After a backing of the above composition has been formed with or without vulcanization and the inclusion of fibrous material, the resultant sheet, of the embodiments of Figs. 2 and 3, is provided on one side with a liner adapted to be permanently retained thereon and on the opposite side with an adhesive preferably of a pressure-sensitive character which requires no activation to render it tacky.

The liner adapted to be permanently retained on the sheeting is preferably one which will be blast-resistant, yet will readily take design impressions, can be cut readily with a knife and will prevent offsetting of the tacky adhesive coating on the opposite side of the sheeting when in contact therewith, when the sheet material is rolled or stacked.

The liner of the embodiments of Figs. 2 and 3 is a treated cellulosic material which is preferably a porous paper or cloth, as for example, a long fibre rope paper, such as Manning rope stock paper or the like, unified by treatment with a saturating solution of the following character expressed in approximately proportionate parts by weight as:

FORMULA B

	Parts
Latex crepe or reclaimed rubber	1
Zinc oxide	1
Rosin	1.6
Beta naphthol	.05
Oleum spirits	2.1

prepared by mixing and churning until the viscosity is approximately between 15–18 secs. at 100° F. The paper or cloth is saturated with this composition in the usual manner of impregnation and, when properly dried, is backsized with a material which takes pencil or ink transfer impressions and is preferably made up as a solution of glue or a cellulose derivative such as ethyl cellulose, cellulose acetate, cellulose xanthate or cellulose nitrate, with or without a suitable plasticizer such as dibutyl phthalate. A suitable formula in proportionate parts by weight is as follows:

FORMULA C

	Parts
Ethyl cellulose	.6
Ethyl alcohol	2.8
Acetone	.6

prepared by cold mixing and coated to the treated paper backing by well-known coating methods. To this composition, during mixing, may be added swelling agents, as zein or the like, placed in solution with water and ethyl alcohol, to aid in transferring prints. Other backsize coatings adapted to receive transfer impressions of the designs to be blasted are shellac, casein, vinyl resins, and "zein" a corn product dissolved in alcohol and water; these coatings are not as desirable as those first mentioned.

After proper drying by evaporation of the solvents, a pressure-sensitive adhesive, as for example of the rubber-resin type of character, as herein described in Formulas D, E, F, with or without whiting, is coated onto the face side of the pre-treated paper and "set-up" by the usual methods known to the practice, whereupon the prepared sheeting is applied by conventional means to the compounded backing for permanent retention thereto.

These liners are of a character which is repellent to the pressure-sensitive adhesive on the opposite side of the compounded backing, thus preventing excessive adhesion and yet permitting the stencil to be rolled or stacked in sheets.

After a backing of the nature desired is formed and the liner attached, the sheet is coated on the side opposite the liner with a pressure-sensitive adhesive containing ingredients which are similar to those used in the backing. Due in part to this similarity and in part to the nature of the adhesive compound, the bond which results when the adhesive is applied to the backing is of such strength that it is practically impossible to cause subsequent separation by mechanical means. This condition prevents lamination or separation even under the most adverse treatment.

An illustrative formula for an adhesive by weight may be:

FORMULA D

	Pounds
Latex crepe rubber	40
Zinc oxide	20
Whiting	20
Solros rosin	26.7
Beta naphthol	.4

The process of making the adhesive which I prefer to employ for the purpose of this invention preferably is carried out by running the latex crepe material for six or seven minutes in the mixer. The pigments, such as the zinc oxide and whiting, are then added, together with the beta naphthol, and the mixing carried on until the pigments are completely dispersed throughout the latex crepe. I then add the Solros rosin and subject the whole batch to a thorough mixing. The batch is then removed from the mill with a scraper and may be stored in trays with a powdered liner until ready for application to the sheeted backing by heating and calendering.

In this formula the relatively large ratio of pigments, such as zinc oxide and whiting, serve to make the adhesive blasting resistant, and the resin in this case serves as a tack-producing ingredient to give the adhesive the desired normally tacky character.

A softer pressure-sensitive adhesive, which is applicable to cold surfaces as cold stone, and to other surfaces, may be employed and is a composition of the following character:

FORMULA E

Part 1

	Pounds
Smoked sheets	50
Zinc oxide	25
Pine tar	3
Resin	.5
Beta naphthol	.5
Peptizing agent	0.15

prepared by milling the smoked sheets on a standard production mill at the approximate temperature of 165° F. until smooth and then adding the peptizing agent, preferably naphthyl beta mercaptan, or if desired, other commercial peptizers (as described in Patents No. 2,064,580 and No. 2,067,299 of Williams et al.), zinc oxide and pine tar with continued milling for 25 minutes, after which the resin (which may be a commercial agerite) and beta naphthol are added with continued milling until the whole is a uniformly compounded mass. The total milling time usually requires a minimum of 30 minutes.

To the composition of Part 1 is further added a plasticizing agent and additional tack-producing resins in the following proportionate parts:

Part 2

	Pounds
Part 1	4.35
Plasticizer (stearic acid)	.50
Rosin (water white)	1.24
Solros rosin	.41

compounded by further milling until the product is uniformly plastic and adhesive whereupon it may be calendered to the prepared backing or stored, as previously indicated, and later warmed for calendering.

An adhesive of a vulcanized pressure-sensitive type possessing such characteristics as to render the compounded backing particularly suitable as a pressure-sensitive adhesive sheeting may be, for example, a composition comprised of the following:

FORMULA F

	Grams
Latex crepe	1000
Zinc oxide	200
Peptizing agent	2
Antioxidant	25
Plasticizer	5
Vulcanizing agent	7

prepared by milling the crepe and zinc oxide for approximately 4 minutes at 20 lbs. steam pressure, adding the peptizing agent, such as "RPA #2," a commercial mercaptan (naphthyl beta mercaptan), or other peptizing agents, such as

are described in the heretofore mentioned patents of Williams et al., and milling the composition for approximately 20 minutes, whereupon an antioxidant, such as "Neozone A" (phenyl alpha naphthylamine), and a plasticizer, such as stearic acid, are added and the mass milled for approximately 30 minutes. This compounded crepe composition is then removed from the milling rolls and placed in an internal mixer, such as a Baker-Perkins Mogul machine, and mixed for 20 hours at approximately 250° F. to 260° F. at which time the vulcanizing agent, preferably a prepared sulfur-bearing compound as "Tetrone A" (dipentamethylenethiuramtetrasulfide) mixed with 500 grams of a filler such as Dixie clay, is added with continued mixing for an additional hour or until such time as is necessary to vulcanize the adhesive. This vulcanized material is then removed from the mixer and calendered in the usual manner of calendering onto the stencil sheet backing. The filler may be omitted if desired.

The adhesives of the foregoing formulae possess great tenacity, and I find that, for some purposes, I am able to reduce its tenacity and yet have it retain the desired degree of adhesion to a surface to which it is applied by reducing the adhesive character thereof. This is accomplished, for example, by increasing the proportion of filler, whiting or the like.

Referring now more particularly to the drawing, a preferred form of the stencil sheet is illustrated in Figures 1 and 2, wherein the reference character 4 indicates a backing sheet which may be formed from a composition of Formula A comprising comminuted base material bonded together by rubber and a rubber modifying agent, or may comprise the composition of Formula A and fibrous material, or a vulcanized rubber compounded backing sheet, as previously fully described. One surface of the backing sheet is provided with an adhesive coating 5 which is of a rubber pressure-sensitive nature and may be made in accordance with the adhesive formulae herein set forth. To the other surface of the backing sheet is secured a treated paper liner 6 adapted to be permanently retained thereon during the sandblasting operation due to the interposed adhesive layer 7. The upper exposed surface of the liner is provided with a thin coating 8 adapted to receive markings and transfer designs to facilitate cutting the desired stencil openings and may comprise a coating prepared in accordance with Formula C, previously stated, or may comprise one of the other liner coatings previously described. The liner 6 is adapted to prevent offsetting of the pressure-sensitive adhesive 5 when the stencil sheet material is rolled prior to its application to a surface to be blasted and need not be removed when the stencil is to be applied to a surface, such, for example, as the slab of marble 9, shown in Fig. 2. The design forming apertures 10 and 11 may be cut in the composite stencil sheet either before application to the surface of the slab or after such application, and it will be understood that the design to be cut in the stencil sheet may be applied to the liner coating 8 by pencil, pen, transfer or other instrument prior to or after application of the stencil on the slab.

When the stencil sheet is applied to the surface of a slab 9, the adhesive coating tenaciously adheres to this surface and is adapted to provide dams 12 along the margins of the stencil apertures 10 and 11, so that the sandblast striking

the exposed surface of the slab through these openings will cut recesses corresponding in shape to the openings and will not deflect and cut away under the stencil sheet itself.

Due to the resilient nature of the adhesive 5, the backing sheet 4 and the liner 6, the particles of sand striking the exposed surface coating 8 of the liner 6, and striking the walls of dams 12, are caused to be repelled or deflected without substantially wearing away this surface.

Referring to the embodiment shown in Fig. 3, this construction is similar to that of Fig. 2 except that the liner 13 is formed of cloth, preferably treated in the manner previously described, instead of paper. The cloth liner is provided with a thin coating 8 adapted to receive markings and transfer designs, and the liner is secured to the backing sheet 4 by an adhesive layer 7. The backing sheet 4 and the adhesive 5 securing the backing to the surface of the slab 9 are preferably formed of the compositions previously described.

By virtue of the permanent liner, I am able to produce a flexible, tough and resilient sandblast stencil sheet that is thinner than those known to the art, and which, because of these properties, adequately resists penetration and wearing away by reason of the high velocity sand particles used in sandblasting operations.

Referring to Fig. 4, wherein a sandblast stencil backing sheet having properties similar to but of a different laminated construction than the embodiments of Figs. 2 and 3, is shown adhesively affixed to the surface of a stone 9. Generally this embodiment comprises a lamination of a thin liner of treated paper 14 or like material coated on both surfaces, having some blast resistant properties but insufficient to withstand alone sandblasts employed in the monumental trade, and a relatively thicker layer of a composition 15 more resistant to the action of a sandblast than the liner 14, said layer 15 being provided on its exposed surface with a back size 16. The liner 14 is preferably a Troya tissue .002 inch thick, although it may comprise a thin layer of Dexter tissue or other paper of suitable strength and thinness or "Cellophane" or cellulose acetate. The Troya tissue liner 14 is first unified by treatment with a saturating solution to prevent splitting of the liner 14 when it is unwound from the roll prior to usage; such solutions are preferably of a rubber resin base which may be prepared in accordance with the following formula:

FORMULA G

Latex crepe rubber	pounds	250
Zinc oxide	do	250
No. 10 rosin	do	400
Beta naphthol	do	2.5
Solvent—such as oleum spirits or heptane	gallons	82

The latex crepe and zinc oxide are first milled to uniformly incorporate the zinc oxide in the milled rubber, and the rosin and beta naphthol are then added and the mixture is then completely disolved in the solvent which may be oleum spirits or heptane. The Troya tissue liner is saturated with this composition in the usual manner of impregnation. Other saturating solutions may be employed, for example, solutions employing reclaimed rubber, gum and a filler which may be whiting in place of zinc oxide. Satisfactory results have also been obtained by employing a saturating solution such as Formula B.

The liner 14 is then coated on both surfaces 17, 18 with a normally tacky adhesive which may be of the composition set forth in Formulas D, E or F or may be prepared according to the following formula:

FORMULA H

	Parts
Latex crepe rubber	90
Zinc oxide	90
No. 10 rosin	40
Beta naphthol	1
Mixture "A"	2.25
50% solution of No. 10 wood rosin in heptane	11

The process of making the adhesive which I prefer to employ for the purpose of this invention preferably is carried out by running the latex crepe rubber for six or seven minutes in a mixer. The zinc oxide and 40 parts of No. 10 rosin, together with the beta naphthol and mixture "A", are then added and the mixing carried on until the materials are completely dispersed throughout the latex crepe. The mixture "A" comprises a mixture of 3 parts of condensation product of acetone and aniline, such as sold under the trade name "Flectol H," and 5 parts of latex crepe, which are thoroughly mixed before being added to the pigmented rubber-rosin batch.

The material is then dissolved in a suitable amount of heptane and the 2 parts of the solution of wood rosin are then added and thoroughly mixed in with the other ingredients.

After the liner 14 has been coated on both of its surfaces with the foregoing adhesive or any of the other previously mentioned suitable adhesives, its calipre is approximately .005 inch.

The blast-resistant layer 15 may be prepared in accordance with Formula A herein, or it may comprise Formula A and the fibrous material as set forth in my copending application Serial No. 275,595, or it may comprise the vulcanized material as described in my copending application Serial No. 275,596, filed May 25, 1939, issued to Patent No. 2,251,646 on August 5, 1941, as previously set forth This material compounded in sheet form, approximately .035 inch thick, is provided on one surface with a back sizing coating 16 which may consist of a glue coating, preferably comprised of hide glue in a solution containing 1 part glue to 3 parts of water, or the back sizing may be prepared in accordance with Formula C herein or it may be formed of a solution of cellulose acetate or cellulose nitrate with or without a suitable plasticizer such as dibutyl phthalate.

The layer 15 with the backing sizing 16 is adhesively combined with the double coated liner 14 as the liner 14 emerges from the coating machine, the back sizing 16 remaining on the exposed surface, as shown in Fig. 4. As indicated in the drawing the adhesive coating 18 serves to retain the composite sheet on the surface to be inscribed without activation of the adhesive.

The composite stencil sheet construction shown in Fig. 4 is particularly advantageous when the layer 15 comprises the vulcanized material previously described, inasmuch as the thin liner 14 tends to inhibit the undesirable stretch of the vulcanized material.

The transfer receptive properties of the back sizing 16, when it comprises a glue coating, may be enhanced by wiping the coating with a 50% solution of glycerine and water just prior to the transfer. The back sizing 16 may also comprise a coating of shellac, casein, vinyl resin or "zein," a corn product dissolved in alcohol and water; these coatings are likewise adapted to receive transfer impressions of the designs to be blasted but are not as desirable as those previously mentioned.

From the foregoing it will be understood that the invention may be produced in several different forms, that is to say, the stencil sheet may be a straight compounded material or a compounded material containing fibre and either prepared in a vulcanized or unvulcanized state, the sheet material having on one side a liner adapted to be permanently retained thereon.

As an alternative formula for the compounded backing, I have had success with a composition wherein the quantity of factice or a similar vulcanized or oxidized vegetable, mineral or animal oil will be employed and increased to about twice that shown in the above compositions. This gives a sheet, for example when used in Formula A, which is more readily slit, but does not have as high resistance to impact of the particles used in the sandblast. Further, the rubber binder material may be substituted by other rubber-like blast-resistant binding agents as rubber derivatives, or substituted rubber derivatives, as "Duprene," Thiokol and the like, reclaimed rubber, resinous materials as "Vistanex" (an isobutylene polymer) and the like.

In the specification and claims where I refer to a "blasting resistant" material or "blasting resistant characteristic" or "blasting resistance," I mean to include thereby a physical character of resiliency, deforming under the impact of an air blast and material entrained thereby, to reassume its normal contour without experiencing substantial abrasion, drying, or hardening, as distinguished from the objectionable warping, shrinking, expanding, drying, hardening and abrasion of other stenciling or masking materials known to me, which under the action of an air blast and materials entrained thereby, exhibit the objectionable characteristics referred to, after blasting. The term "sandblast stencil" or "sandblast stencil sheet," as used in the specification and claims, denotes sheet material intended for and suitable for use in sandblasting inscriptions on stone both before and after a stencil aperture has been cut therein.

From the foregoing description it will be seen that I have provided a laminated sheet comprising a layer of a blasting-resistant material in the nature of a rubber-like sheeting including filling agents bonded with a vulcanized or unvulcanized binder which affords easy cutting, a liner having blast-resistant properties adapted to be permanently retained on one side of the rubber-like sheeting and a backsizing capable of taking transfer impressions, the composite being retained on the surface to be inscribed by a pressure-sensitive adhesive which adheres without activation.

What I claim is:

1. As a new article of manufacture, composite sheet material having the properties of flexibility and resistance to impact of abrasive particles, comprising a rubber compounded blast-resistant backing, a permanent liner secured to a surface of said backing, a coating adapted to receive transfer impressions and prevent the offsetting of adhesive thereon on the exposed surface of said composite material, and an adhesive coating on the other surface of said composite material adapted to retain asid composite sheet material on the article to be inscribed.

2. As a new article of manufacture, laminated sheet material comprising an inherently flexible blast-resistant rubber-compounded sheet backing, a layer of a pressure-sensitive adhesive on one surface of said laminated sheet, a sheet of treated cellulosic material adhesively secured to the said backing, and a coating of a cellulose derivative adapted to receive transfer impressions on the other surface of said laminated sheet.

3. As a new article of manufacture, laminated sheet material comprising an inherently flexible rubber-compounded blast-resistant backing, a coating of a non-drying normally ressure-sensitive adhesive on one surface of said laminated material, a liner of treated paper adhesively secured to the other surface of said backing, and a coating of the group comprising a cellulose derivative, glue, and casein, adapted to receive transfer impressions and prevent the offsetting of adhesive thereon, on the other surface of said laminated material.

4. As a new article of manufacture, laminated sheet material comprising an inherently flexible rubber-compounded blast-resistant backing, a coating of a non-drying normally pressure-sensitive adhesive on one surface of said backing, a liner of treated fabric adhesively secured to the other surface of said backing, and a coating of the group comprising a cellulose derivative, glue, and casein, adapted to receive transfer impressions on the exposed surface of said liner.

5. As a new article of manufacture, laminated sheet material comprising a backing of comminuted base material bonded together by a rubber binder, a coating of a pressure-sensitive adhesive on one surface of said backing, a liner of cellulosic material adhesively secured to the other surface of said backing, and a coating of a cellulose derivative adapted to receive transfer impressions on the exposed surface of said liner.

6. As a new article of manufacture, laminated sheet material comprising a backing of comminuted base material bonded together by a rubber binder and an oil modifying agent adapted to reduce the toughness of said rubber, a coating of a pressure-sensitive adhesive on one surface of said backing, a liner adhesively secured to the other surface of said backing, and a coating of glue adapted to receive transfer impressions on the exposed surface of said liner.

7. As a new article of manufacture, laminated sheet material having the properties of flexibility and resistance to impact of abrasive particles, comprising a rubber-compounded blast-resistant backing, a pressure-sensitive rubber base adhesive on one surface of said backing, an adhesive coating on the other surface of said backing adapted to secure thereto a liner of treated cellulosic material adapted to be retained thereon during the sandblasting operation.

8. As a new article of manufacture, sandblast stencil sheet material having the properties of flexibility and resistance to impact of abrasive particles, comprising a blast-resistant rubber-compounded sheeted backing, a coating of a pressure-sensitive rubber base adhesive on one surface of said backing, an adhesive coating on the other surface of said backing securing thereto a unified liner of cellulosic material adapted to be retained thereon during the sandblasting operation.

9. As a new article of manufacture, sandblast stencil sheet material in laminated form and having the properties of flexibility and resistance to the impact of abrasive particles, comprising a backing sheet of a compounded rubber material, adhesive coatings on each surface of said backing sheet, a liner of cellulosic material impregnated with a rubber solution to impart blast-resistant properties to said liner and permanently secured to one of said adhesive coatings.

10. As a new article of manufacture, sandblast stencil sheet material having the properties of flexibility and resistance to impact of abrasive particles, comprising a thin liner of treated cellulosic material, coated on both surfaces with a rubber base pressure-sensitive adhesive, and a blast-resistant rubber-compounded sheet backing, said liner being secured thereto by one of said adhesive coatings, the other adhesive coating being adapted to retain said sandblast stencil sheet material on a surface to be sandblasted.

11. As a new article of manufacture, sandblast stencil sheet material having the properties of flexibility and resistance to impact of abrasive particles, comprising a thin paper liner of cellulosic material impregnated with a primer and coated on both surfaces with a rubber resin pressure-sensitive adhesive, and a blast-resistant rubber-compounded sheet backing, said liner being secured thereto by one of said adhesive coatings, the other adhesive coating being adapted to retain said sandblast stencil sheet material on a surface to be sandblasted.

12. As a new article of manufacture, laminated sheet material having the properties of flexibility and resistance to impact of abrasive particles, comprising a thin liner of cellulosic material impregnated with a rubber base solution, an adhesive coating on each surface of said liner, a backing layer of comminuted base material bonded together by a rubber binder, said liner being retained thereto by one of said adhesive coatings, and a coating of the group comprising a cellulosic derivative, glue and casein, adapted to receive transfer impressions on the exposed surface of said backing.

13. As a new article of manufacture, laminated sheet material having the properties of flexibility and resistance to impact of abrasive particles, comprising a thin liner of cellulosic material impregnated with a rubber base solution, an adhesive coating on each surface of said liner, a backing layer of comminuted base material bonded together by a rubber binder, said liner being retained thereto by one of said adhesive coatings, and a coating of glue adapted to receive transfer impressions on the exposed surface of said backing.

14. As a new article of manufacture, laminated sheet material having the properties of flexibility and resistance to impact of abrasive particles, comprising a thin liner of cellulosic material impregnated with a priming solution, an adhesive coating on each surface of said liner, a backing layer of comminuted base material bonded together by a rubber binder, said liner being retained thereto by one of said adhesive coatings, and a coating of a cellulose derivative adapted to receive transfer impressions on the exposed surface of said backing.

15. As a new article of manufacture, laminated sheet material having the properties of flexibility and resistance to impact of abrasive particles, comprising a thin liner of a pretreated cellulosic material, an adhesive coating on each surface of said liner, a backing layer of comminuted base material bonded together by a rubber binder, said liner being retained thereto by one of said adhesive coatings, and a coating of ethyl cellulose

adapted to receive transfer impressions on the exposed surface of said backing.

16. As a new article of manufacture, a stencil designed for use in cutting letters, symbols or designs on a surface by way of an abrasive blast, and comprising a composite sheet adapted to be placed against the surface and upon proper shaping thereof to control the blast so that it forms or cuts the desired letters, symbols or designs on said surface and including an abrasive-resistant outer layer formed of an appreciable amount of vulcanized rubber and an admixture of a material serving to render said vulcanized rubber tough and substantially inelastic, and an inner layer comprising a permanent liner impregnated with a composition comprising an appreciable amount of uncured rubber, and an adhesive coating on the exposed face of the inner layer for holding the sheet in adhesively connected relation with said surface.

17. As a new article of manufacture, a stencil designed for use in cutting letters, symbols or designs on a surface by way of an abrasive blast, and comprising a composite sheet adapted to be placed against the surface and upon proper shaping thereof to control the blast so that it forms or cuts the desired letters, symbols or designs on said surface and consisting of an abrasive-resistant outer layer including a substantial amount of vulcanized rubber and an admixture of a material serving to toughen the rubber and make it substantially inelastic, and an inner layer including a substantial amount of unvulcanized rubber in it and a fibrous sheeted medium for making said unvulcanized rubber substantially inelastic, and an adhesive coating on the exposed face of the inner layer for holding the sheet in adhesively connected relation with said surface.

18. As a new article of manufacture, a stencil designed for use in cutting letters, symbols or designs on a surface by way of an abrasive blast, and comprising a composite sheet adapted to be placed against the surface and upon proper shaping thereof to control the blast so that it forms or cuts the desired letters, symbols or designs on said surface and comprising an abrasive-resistant, substantially inelastic outer layer including an impregnated fibrous sheet and an inner layer including a substantial amount of unvulcanized rubber and an admixture of a toughening agent comprising glue, and an adhesive coating on the exposed face of the inner layer for holding the sheet in adhesively connected relation with said surface.

19. As a new article of manufacture, a sandblast stencil sheet material having the properties of flexibility and resistance to impregnation of abrasive particles, comprising a fibrous sheet permanent liner impregnated with a primer and coated on both surfaces with an adhesive, and a blast-resistant rubber-compounded sheet backing, said liner being secured thereto by one of said adhesive coatings, the other adhesive coating being adapted to retain said sandblast stencil sheet material on a surface to be sandblasted.

20. As a new article of manufacture, a stencil designed for use in cutting letters, symbols or designs on a surface by way of an abrasive blast, and comprising a composite sheet adapted to be placed against the surface and upon proper shaping thereof to control the blast so that it forms or cuts the desired letters, symbols or designs on said surface and including an abrasive-resistant outer layer formed of an appreciable amount of vulcanized rubber and an admixture of a material serving to render said vulcanized rubber tough and substantially inelastic, and an inner layer containing uncured rubber, and an adhesive coating on the exposed face of the inner layer for holding the sheet in adhesively connected relation with said surface.

21. As a new article of manufacture, a stencil designed for use in cutting letters, symbols or designs on a surface by way of an abrasive blast, and comprising a composite sheet adapted to be placed against the surface and upon proper shaping thereof to control the blast so that it forms or cuts the desired letters, symbols or designs on said surface and comprising an abrasive-resistant outer layer including a substantial amount of vulcanized rubber and an admixture of a material serving to toughen the rubber and make it substantially inelastic, and an inner layer including unvulcanized rubber in it and a material for making said inner layer tough and substantially inelastic, and an adhesive coating on the exposed face of the inner layer for holding the sheet in adhesively connected relation with said surface.

22. As a new article of manufacture, a stencil designed for use in cutting letters, symbols or designs on a surface by way of an abrasive blast, and comprising a composite sheet adapted to be placed against the surface and upon proper shaping thereof to control the blast so that it forms or cuts the desired letters, symbols or designs on said surface and comprising an abrasive-resistant outer layer embodying an appreciable amount of vulcanized rubber and an admixture of a material whereby said vulcanized rubber is rendered tough and substantially inelastic, and an inner layer containing uncured rubber, said sheet as a whole being flexible and capable of setting to the proper extent for shape cutting, and a coating of permanently tacky pressure-sensitive rubber base adhesive applied to and completely covering the exposed face of the inner layer and adapted to hold the sheet in adhesively connected relation with said surface.

23. As a new article of manufacture, a stencil designed for use in cutting letters, symbols or designs on a surface by way of an abrasive blast, and comprising a composite sheet adapted to be placed against the surface and upon proper shaping thereof to control the blast so that it forms or cuts the desired letters, symbols or designs on said surface and comprising a comparatively thin abrasive-resistant outer layer embodying a substantial amount of vulcanized rubber and an admixture of a material serving to render the vulcanized rubber tough and substantially inelastic, and an inner layer of less thickness than the outer layer and including unvulcanized rubber in it and in addition embodying a material whereby said inner layer is also rendered tough and substantially inelastic, and an adhesive coating on the exposed face of the inner layer for holding the sheet in adhesively connected relation with said surface.

ALFRED J. WARTHA.

Certificate of Correction

Patent No. 2,410,472. November 5, 1946.

ALFRED J. WARTHA

It is hereby certified that errors appear in the printed specification of the above numbered patent requiring correction as follows: Column 3, line 19, for "wil" read *will*; lines 64 and 69, for the word *"writing"* read *whiting*; column 11, line 24, before "condensation" insert *a*; column 12, line 74, claim 1, for "asid" read *said*; column 13, lines 13 and 14, claim 3, for "ressure-sensitive" read *pressure-sensitive*; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 30th day of March, A. D. 1948.

[SEAL]

THOMAS F. MURPHY,
Assistant Commissioner of Patents.