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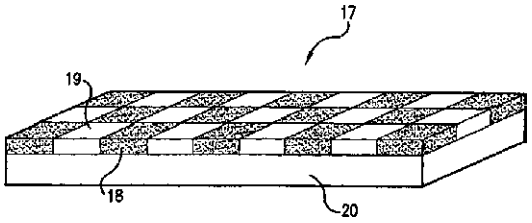
(54)【発明の名称】乾燥時に粘着性でありかつ濡れているときに粘着性である性質を有する粘着性表面を有するフロアマット

(57)【要約】
【課題】乾燥時に粘着性でありかつ濡れているときに粘着性である性質を有する粘着性表面を有するフロアマットを提供すること。
【解決手段】進歩したフロアマット（１００）を開示する。本発明の一実施形態においては、該フロアマットは、清浄可能な部分（３００）を有する。また該フロアマットは、水散逸部材（２３０）と、水吸収要素（４２０）と、緩衝部材（２４０）と、カスタマイズされたグラフィック（３００）と、透明な清浄可能な部分と、該清浄可能な部分上の粘着性の表面（３０１、３０２、３０３）と、抗菌性組成物（１００）と、殺菌性組成物（１００）と、芳香剤（１００）とを有する。
【選択図】図２５



【特許請求の範囲】
【請求項１】
上部露出粘着性表面を備えるフロアマットであって、前記上部露出粘着性表面が、乾燥しているときに粘着性である第１の粘着性組成物と、湿っているときに粘着性である第２の粘着性組成物とを組合せることによって形成されているフロアマット。
【請求項２】
前記上部露出粘着性表面とは別の構成部材であるスリップ防止部材をさらに備える請求項１に記載のフロアマット。
【請求項３】
前記スリップ防止部材がトレッドである請求項２に記載のフロアマット。
【請求項４】
前記上部露出粘着性表面が、該表面に開口部を含み、前記トレッドが前記開口部を通って延びている請求項３に記載のフロアマット。
【請求項５】
前記トレッドが、前記上部露出粘着性表面の上に延びている請求項３に記載のフロアマット。
【請求項６】
前記トレッドが、前記上部露出粘着性表面の下に配設された部材の表面から延びている請求項３に記載のフロアマット。
【請求項７】
前記トレッドが、前記上部露出粘着性表面の上に延びる高さよりも実質的に大きい、前記上部露出粘着性表面を越えて延びる長さを有する細長い部材である請求項３に記載のフロアマット。
【請求項８】
前記トレッドが、該トレッドの長さに沿って複数の溝部を有する請求項３に記載のフロアマット。
【請求項９】
前記トレッドが耐水性である請求項３に記載のフロアマット。
【請求項１０】
前記スリップ防止部材が、複数回の使用後も、前記上部露出粘着性表面上での滑りを防ぐ機能を維持している請求項２に記載のフロアマット。
【請求項１１】
前記上部露出粘着性表面を提供する物質が、複数の物質領域の組合せが乾燥しているときおよび湿っているとき共に粘着性であるような複数の物質領域を含む請求項１に記載のフロアマット。
【請求項１２】
前記複数の物質領域が、前記フロアマットの上部層の少なくとも一部を構成し、前記フロアマットが、前記上部層に隣接する非粘着性疎水性層と、前記疎水性層に隣接する親水性層とをさらに備える請求項１１に記載のフロアマット。
【請求項１３】
前記フロアマットが、床に接触するための耐水性の滑り止め層をさらに備える請求項１２に記載のフロアマット。
【請求項１３】
前記複数の物質領域が、粘着性の圧力に敏感に反応する領域と、非粘着性の疎水性領域と、親水性領域とを有する請求項１１に記載のフロアマット。
【請求項１４】
前記第１及び第２の粘着性組成物が、互い違いの領域からなるパターン状に配設されている請求項１に記載のフロアマット。
【請求項１５】
前記第１の粘着性組成物が、感圧性である請求項１４に記載のフロアマット。

【請求項１６】
前記第２の粘着性組成物が、天然ゴム及び合成ゴムのうちの少なくとも一方を含む請求項１４に記載のフロアマット。
【請求項１７】
前記互い違いの領域が、前記フロアマットの上部層の少なくとも一部を構成し、前記フロアマットがさらに、床に接触するための耐水性の滑り止め層を少なくとも備える請求項１４に記載のフロアマット。
【請求項１８】
前記上部露出粘着性表面となる物質が、均質な組成物を有する請求項１に記載のフロアマット。
【請求項１９】
前記均質な組成物が、親水性モノマーで覆われた感圧性の粘着物を含む請求項１８に記載のフロアマット。
【請求項２０】
前記均質な組成物が、親水コロイドゴムと混合された感圧性の粘着物を含む請求項１８に記載のフロアマット。
【請求項２１】
前記均質な組成物が、粘着剤をさらに含む請求項２０に記載のフロアマット。
【請求項２２】
前記フロアマットが、パターン状にエンボス加工されている請求項１に記載のフロアマット。
【請求項２３】
前記フロアマットは、孔が形成されている請求項１に記載のフロアマット。
【請求項２４】
複数の物質領域の組合せが乾燥しているときおよび湿っているとき共に粘着性であるような複数の物質領域を備える上部層と、
前記上部層に隣接する非粘着性の疎水性層と、
前記疎水性層に隣接する親水性層と、
床に接触するための耐水性の滑り止め層とを備えるフロアマット。
【請求項２５】
乾燥しているときに粘着性である第１の粘着性組成物と、湿っているときに粘着性である第２の粘着性組成物とからなる互い違いの領域を備える上部層と、
床に接触するための耐水性の滑り止め層とを備えるフロアマット。
【請求項２６】
乾燥しているときに粘着性である物質からなる上部層と、
前記上部層に隣接する物質からなる第２の層であって、湿っているときに粘着性である第２の層と、
床に接触するための耐水性の滑り止め層とを備え、
前記上部層が、清掃される面を、前記第２の層に接触させると共に、前記上部層にも接触させることができるようにするための孔部を有するフロアマット。
【請求項２７】
前記第２の層が親水性である請求項２７に記載のフロアマット。
【請求項２８】
均質な質感を形成するために混合された複数の物質を含む上部層であって、前記複数の物質のうちの少なくとも第１のものが感圧性の乾燥粘着物であり、前記複数の物質のうちの少なくとも第２のものが親水コロイドゴムである上部層と、
床に接触するための耐水性の滑り止め層とを備えるフロアマット。
【発明の詳細な説明】
【０００１】
本出願は、２０００年１１月に提出された米国仮出願第６０／２４６，６０２号の米国特

許法第１１９号第（ｅ）項における利益を主張する。また本出願は、２０００年４月１９日に提出され、２００１年５月２２日に米国特許第６，２３３，７７６号として発行された米国特許出願第０９／５５３，２３４号の一部継続出願である。米国特許出願第０９／５５３，２３４号は、１９９９年５月４日に提出され、２００１年４月２４日に米国特許第６，２１９，８７６号として発行された米国特許出願第０９／３０４，０５１号の一部継続出願であって、かつ１９９９年１０月１５日に提出された、米国特許出願第０９／４１８，７５２号の一部継続出願である。

【０００２】

【発明の属する技術分野】

本発明は、フロアマットに関する。具体的には、本発明は、清浄可能な部分を有するフロアマットを提供する。該フロアマットは、水散逸部材と、水吸収部材と、緩衝部材と、カスタマイズされたグラフィックと、透明な清浄可能な部分と、該清浄可能な部分上の粘着性の表面と、抗菌性組成物と、殺菌性組成物と、芳香剤とを有する。上記清浄可能な部分は、腐蝕性でもよく、また複数の清浄可能で再使用可能な層を含んでもよい。粘着性の表面が上記フロアマットに含まれている場合、濡れるかもしれない粘着性の表面上で滑るのを防ぐことを補助するために、滑り止めの特徴を該粘着性の表面と関連付けてもよい。さらに、上記フロアマットが清浄を要するときを識別する際に使用者を補助するために、センサシステムを該フロアマットに含ませてもよい。

【０００３】

【従来の技術】

特定のエリアまたは部屋に入ろうとする人の靴底を清浄するためのフロアマットは公知である。フロアマットについての一般的な一つの問題は、該フロアマットが、その機能を実行する際に、その性質によって意図的に汚れた場合、人の靴を清浄する機能を該フロアマットが実行するように、該フロアマットをどのようにして充分清浄な状態に維持するかである。

【０００４】

公知のフロアマットは、単一の一体の物質からなる。この単一構造のフロアマットは、例えば、該フロアマットを洗浄することにより清浄に保つことができるので、洗浄のために該フロアマット全体をその配設位置から移動することを要し、該マット全体を清浄する所望の場所で使用することができない。別法として、たとえ該マットを定位置で清浄することが可能でも、それは該マットが例えば敷きつめられたエリア内に配置される可能性ではないが、該マットを定位置で清浄するのは不便である。

【０００５】

Ａｍｏｓに付与された米国特許第３，７８５，１０２号は、特定のシートが汚れたときに、該汚れたシートを取り去って処分する、複数の使い捨ての清掃シートを備える使い捨てパッドを開示している。該汚れたシートが廃棄された後にさらされる新しいシートは清浄なため、再び清浄な表面を使用できる。しかし、使い捨てシートからなるフロアマットについては問題がある。汚れた後に各シートが廃棄されるので、各汚れたシートを捨てることは非経済的である。また、ある限定数のシートが捨てられた後には、シートは残らないため、使用できる有効な清浄面はない。

【０００６】

また、Ａｍｏｓに付与された米国特許第３，７８５，１０２号は、人の靴から汚れを取り除く能力を向上させるために、粘着物を各シートの表面に設けることができることを開示している。しかし、これらのシートも清浄可能ではなく、そのため再利用可能でない。

【０００７】

Ａｍｏｓらに付与された米国特許第３，７１７，８９７号は、靴及び車輪を清浄するためのパッドを開示している。該パッドは、靴及び車輪から汚れを取り除くための、その上面を覆う薄い水洗可能な粘着物を含む。この米国特許第３，７１７，８９７号は、水洗可能な粘着物の上面を有するパッドを開示しており、該パッドは、家庭又はオフィスタイプの用途での使用に対しては知られていない。米国特許第３，７１７，８９７号に記載してあ

るように、上記パッドは、クリーンルームに通じる出入り口に配設される。
【０００８】
粘着性フロアマットは、例えば病室、コンピュータチップの製造空間及び体育館等の、該マットが使用される建物の充分内部にあるクリーンルームために、入口の外側の外界から遠く隔たった屋内環境での利用に対して良く普及している。従って、粘着性フロアマットは、例えば、玄関の広間や屋外ポーチ等での、建物の内部に入る前に人の靴底を清浄するための、屋外環境からつながる入口に隣接するエリアでの使用に対しては知られていない。
【０００９】
【発明が解決しようとする課題】
粘着性フロアマットは、いくつかの欠点のため、例えば自宅やオフィスでの使用等の、家庭やオフィスでの用途での使用に対しては知られていない。これらの欠点のうちの一つは、粘着性表面は、濡れた場合に有効でないという点である。そのため、自宅やオフィスに入る前に人の靴底を清浄するために、粘着性表面のフロアマットを、上述の屋外ポーチ等の屋外環境で使用した場合、あるいは自宅やオフィスの玄関の広間等の屋外玄関に隣接した屋内環境、または屋外玄関の近くの屋内環境で使用した場合、該マットは濡れることがあり、そのため有効でない。該マットは、例えば、大気中の湿気、あるいは該マットを踏む人の靴底の水分によって濡れることがある。また、粘着性表面が濡れた場合、該表面は滑りやすくなり、そのため該表面上を歩く者に対して危険を生じる。
【００１０】
特に、過去数十年間にわたって、一般にフロアマットの粘着性表面に用いられる粘着物は、該粘着物が、商品化を通して一定の限度の粘着性まで最適化されてきた段階まで進化した。それにもかかわらず、この最適な限度においても、上記粘着性表面は、濡れたときに滑りやすくなるという上述の欠点を有する。
【００１１】
上記粘着性表面に使用する粘着物の化学的性質を調整することによりこの問題を処理する努力は無駄であった。上述したような最適な粘着性の限度を越えると（すなわち、粘着性表面がより粘着に形成された場合）、該表面が乾燥したときに、つまずく可能性がある。一方、上記限度以下の場合には（すなわち、粘着性表面がより低い粘着性で形成された場合）、該粘着性表面が濡れると、滑る可能性がある。
【００１２】
上記に鑑みて、濡れているときおよび乾燥しているとき共に粘着性である粘着性表面を形成する一つの粘着物に対する単一の化学的性質は知られていない。従って、湿った環境及び乾燥した環境において使用できる粘着性表面を有するフロアマットに対する要望がある。
【００１３】
公知の粘着性フロアマットを、上述したような自宅又はオフィスでの用途に対して使用することに伴う別の欠点は、つまずく可能性があるということと、美的魅力が不足しているということである。米国特許第３，７１７，８９７号においては、パッドがクリーンルーム環境での使用のために設計されているため、該パッドは、出入り口の前で通路の床に粘着的に付着されている。このことは、クリーンルームのような用途において、マットを定位置に保持するのには申し分ないが、米国特許第３，７１７，８９７号に記載のパッドをじゅうたんを敷きつめたフロアに使用した場合、つまずく可能性がある。これは、重大な責任問題をまねく可能性がある。米国特許第３，７１７，８９７号に記載のパッドは、接着剤を用いることなく定位置に保持するための十分な大きさを有していない。見た目に関しては、粘着性フロアマットは、その機能的特徴に対してのみ知られており、従ってクリーンルームのような用途に対してのみ知られているので、美的満足感は得られない。従って、少なくとも上述の理由の場合、粘着性フロアマットは、自宅やオフィスのような用途における使用に対しては知られていない。
【００１４】

公知のフロアマットに対するさらに別の欠点は、特定の購入者に対するカスタマイズの問題と、更なるクリーニング性の不足である。フロアマットは、特定の家や店に対する訪問者が遭遇する最初の物体である可能性がある。従って、家や店のオーナーは、該訪問者に対する最初の挨拶またはメッセージを視覚的に伝えるためにフロアマットを利用しようとする。フロアマットは、挨拶文を含むことが可能であることが知られているが、購入者が所望する特定のメッセージを伝えるように該メッセージを調整するために、特定の購入者が表示するデザインをカスタマイズできるようにすることは現在知られていない。例えば、購入者は、ハロウィーンの時に、該フロアマットに、「ハッピー・ハロウィーン」というメッセージを表示したいかもしれない。また別の状況においては、購入者は、「ハロー・ジョー」等のメッセージによって特定の訪問者に挨拶したいかもしれない。現在、各個人が、伝えたい特定のメッセージを表示するようにフロアマットをカスタマイズできる、およびある状況において、フロアマットのメッセージを伝えたいものに変更できるフロアマットを実現することは知られていない。

【００１５】

また公知のフロアマットに対する別の問題は、上述したように、該マットは、人の靴底を清浄する能力が限定されているということである。公知のフロアマットは、靴底から汚れた粉塵を取り除くことができるが、該靴底を清浄できないだけでなく、該靴に関連する不愉快な匂いを遮断する場合に補助するように香りを該靴底に与えることもできない。

【００１６】

また公知のフロアマットに対する別の欠点は、該フロアマットが清浄可能であっても、該フロアマットが清浄を要するときを判断する際に、使用者を援助しないということである。一般に、フロアマットの所有者又は管理人は、該フロアマットがきれいかどうかを継続的または定期的に監視しているわけではない。そのため、該フロアマットはクリーニングを要求することができず、また該所有者は、該フロアマットの状態を意識して監視してはいないので、該フロアマットがクリーニングを要することを認識する前には、重要な期間があった。従って、該フロアマットがクリーニングを要するときを判断する際に、該フロアマットの所有者／管理人を補助することが望ましいであろう。

【００１７】

従って、公知のフロアマットに付随する欠点を処理する進歩したフロアマットを実現できることが望ましい。

【００１８】

【課題を解決するための手段】

本発明にかかる進歩したフロアマットは、従来技術の欠点を克服し、取外し可能に該フロアマット内に収容されるようになっている清浄可能な部分を組込むベース部を有する。また該フロアマットは、水散逸能力、吸水能力、緩衝能力、カスタマイズされたグラフィック、透明な部分、清浄可能な部分上に設けられた粘着性表面、抗菌性組成物、殺菌性組成物及び芳香剤等の特徴を有する。上記清浄可能な部分は、腐蝕可能であり、かつ複数の清浄可能で再利用可能な層を含むという特徴を有してもよい。上記フロアマットに粘着性表面が含まれる場合、濡れるかもしれない粘着性表面で滑ることを防ぐために、該粘着性表面に、滑り止めの特徴を関連付けてもよい。また、上記フロアマットがクリーニングを要するときを識別する際に使用者を補助するために、センサシステムを該フロアマットに設けることもできる。他の特徴は、以下の詳細な説明から明らかになるであろう。

【００１９】

本発明の様々な特徴は、以下の説明を参照すると共に、添付図面を参照することにより認識されよう。

【００２０】

【発明の実施の形態】

図１は、本発明の原理に従ったフロアマット１００に対する第１の実施形態を示す。図１を見て分かるように、フロアマット１００は、ベース部２００と、清浄可能な挿入部３００とを有する。本明細書中で後にさらに説明するように、この実施形態においては、清浄

可能部３００は、ベース部２００内に収容され、またベース部２００から取り外し可能である。

【００２１】

図２は、図１のフロアマットの分解斜視図を示す。図２を見て分かるように、ベース部２００は、概して平坦な平面部材として形成され、ベース部２００の上面内に凹部２１０を画定する。ベース部２００は、清浄可能な挿入部３００を支持するために、およびフロアマットの配置される面上での位置決めのための十分な重量及び大きさを装備する。ベース部２００は、以下に考察するように、水散逸能力、吸水能力及び緩衝能力を有してもよく、かつポリウレタン、ポリイソプレン、および多孔性構造を形成するように成型または形成されたナイロン６等の他の架橋エラストマー材等の材料で構成することができる。凹部２１０は、種々の幾何学形状で形成することが可能であるが、本実施形態においては、凹部２１０は矩形状に形成されている。凹部２１０は、長さL_1及び幅W_1を有する。凹部２１０の深さは、洗浄可能な挿入部３００が凹部２１０内に収容されたときに、洗浄可能な挿入部３００の上面がベース部２００の上面と同じ面内に概して位置するように、洗浄可能な挿入部３００を該凹部内に収容できるようになっている。

【００２２】

ベース部２００の上面は、特定の購入者の希望により、所望の色で色付けすることができるが、ベース部２００に蓄積される汚れの視認度を最少化するような色使いが好ましい。例えば、ベース部２００の上面に対しては、薄い色よりも濃い色を使用することが望ましい。しかし、どのような色でも、個々の特定の要求により、ベース部２００に対して、特にベース部２００の上面に対して使用することができる。また、ベース部２００は、透明でも不透明でもよい。

【００２３】

図２を見て分かるように、凹部２１０の底部を画定するベース部２００の表面は、該表面上にグラフィック２２０を含んでもよい。図示の実施形態においては、該グラフィックは、花の絵柄と、「ＷＥＬＣＯＭＥ」とはっきり書かれた文字のメッセージを含む。本発明は、凹部２１０内における特定のグラフィックに限定されず、本発明は、種々の異なる形態のグラフィックを含んでよい。

【００２４】

グラフィック２２０は、フロアマットが所有者に購入された後に、個別に変更すなわちカスタマイズすることができる。該所有者は、該マットを自宅又はオフィスでカスタマイズし、それに伴って、特定の状況に適するグラフィックを、他の状況における表示のために個々に変更することができる。例えば、上記グラフィックは、ハロウィーンのために「ハッピー・ハロウィーン」というメッセージを表示してもよく、冬のホリデーシーズン中には「ハッピー・ホリデー」と表示するように変更してもよい。従って、該グラフィックは、使用者により変更可能であり、特定の使用者の特定の要望によりカスタマイズすることができる。

【００２５】

上述したように、本発明は、グラフィック２２０に対して特定の形態に限定されない。グラフィック２２０は、種々の異なる色、絵、メッセージ、あるいは使用者が表示することを望む他の表示のいずれも含むように、使用者によりカスタマイズすることができる。また、色の視認強度は、変更することができる。例えば、夜間に光る色を、ハロウィーン等の機会にグラフィック２２０に含ませることができる。

【００２６】

本発明においては、フロアマット１００のグラフィック２２０を変更するために、種々の異なるタイプの構成または方法のいずれも実施することができ、また本発明は、グラフィック２２０を変更するためのどのような特定の方法または構成にも限定されない。さらに、本発明のフロアマットにおいて変更可能なグラフィック表示を表示するために意図された種々の全ての実施形態は、上記ベース部または上記挿入部のいずれかまたは両方に組み込むことができる。例えば、該グラフィックは、接着剤等を用いて、凹部２１０の底部を

画定する面、またはフック部やループアセンブリ等の係合アセンブリのいずれかに付着できる、あるいは、挿入部３００がベース部２００内に配置されたときに、上記グラフィックが透明な挿入部を通して見えるように挿入部３００の下面に付着できる、予め形成されたメッセージまたは図柄で構成してもよい。

【００２７】

別法として、種々の異なるグラフィックは、使用者が、表示のための特定のグラフィックを選択的に見えるようにすると共に、残りの使用可能なグラフィックをフロアマット１００内に隠しておくように、フロアマット１００内に収容しておくことができる。この種の選択性は、共通のディスプレイパネル内での種々の異なるグラフィック間の選択性が所望される他の媒体においては知られている。例えば、スポーツイベントでの広告掲示板は、同じ掲示板上で、第１の特定の期間の間に第１の特定のメッセージを、また第２の期間に第２のメッセージを選択的に表示することができる。

【００２８】

第３の可能な代替例は、変更可能な表示を該フロアマット上に設けることである。該表示面は、上記ベース部又は挿入部のいずれかに、例えば、凹部２１０の底面上又は挿入部３００の底部に取り付けるかの何れかと関連付けることができる。表示は、上記フロアマットの前面、または上記マットの透明部を通して見えるように該マットの背面に含ませることができ、あるいは、該マット内に埋め込み、該マットに取付け、または該マットに一体に形成することができる。例えば、該表示は、粘着性の部分および／またはベース部又は上記フロアマットの他のいずれかの構成部品に取付け可能な、グラフィックスの小さくて薄いボックスで構成することができる。しかし、該表示は該フロアマットと関連しており、使用者は、カスタマイズされたグラフィックをデザインおよび表示することができ、また他のグラフィックと交換するために該グラフィックを後に変更してもよい。この目的のために、消去可能な書き込みボード等の表示面を使用することができる。

【００２９】

また、例えば液晶ディスプレイ等の変更可能な電子表示面を実現できることも意図されている。該ディスプレイはコンピュータに接続し、該コンピュータが生成した画像を該ディスプレイ上に表示することができる。従って、該ディスプレイ上に表示された画像は、別のコンピュータ画像を生成して該ディスプレイ上に表示することにより変更することができる。該ディスプレイは、凹部２１０内に含ませるようにベース部２００と関連付けることができ、あるいは、挿入部３００の上方に面している底面上に含ませることができる。別法として、該ディスプレイは、上記ベース部又は挿入部のいずれかと一体形成することができる。上記変更可能なディスプレイは、種々の方法で該ディスプレイ上に表示できる複数の異なるグラフィックを利用することができる。例えば、該グラフィックは、該ディスプレイ上の固定位置に表示することができ、あるいは、複数のグラフィックを個別にまたは組み合わせて表示する具体的な方法を用いて、該ディスプレイ上でスクロールさせることができる。

【００３０】

フロアマット１００のグラフィック２２０を変更する他の代替例では、グラフィック２２０を形成して変化させるための発光ポリマーを使用する。該発光ポリマーは、上記フロアマットに塗布、取付け、あるいは組み込むことができる。該発光ポリマーは、例えば、上記ベース部又は挿入部のいずれか、あるいは該フロアマットに対する別の実施形態のいずれかの部分等の、フロアマット１００のどの部分にも使用することができる。発光ポリマーは公知であり、米国特許第５，９４５，５０２号、同第５，８６９，３５０号及び同第５，５７１，６２６号に記載されており、これらはその全体が参照としてここに組み込まれる。

【００３１】

表示に対する他のオプションは、電子インク又は電子ペーパーを用いることである。電子ペーパーはゼロックス社製であり、米国特許第５，７２３，２０４号、同第５，６０４，０２７号、同第４，１２６，８５４号及び同第４，１４３，１０３号に記載されており、

これらはその全体が参照としてここに組み込まれる。電子ペーパーは、各々が人の髪の毛の幅で画素を形成する、ジリコン（Ｇｙｒｉｃｏｎ）と呼ばれる数千の小さな帯電ビーズを利用する。電子ペーパーの表面を構成する、液体入りのプラスチックシートの内側に、２つの色調のビーズが埋め込まれている。半分黒で半分白い各ビーズは、電界に応答して回転する。該ビーズが黒側または白側を上にしているかにより画像が決定される。該画像をリフレッシュする必要がないため、およびスクリーンはバックライトがないので、電子ペーパーは、従来の電子ディスプレイで消費される電力の何分の一かの電力しか消費しない。該電子ペーパー上に画像を得るために、電磁針及びプリンタのような装置を使用することができる。

【００３２】

電子インクは、０２１３８、米国、マサチューセッツ州、ケンブリッジ、スピネリ　プレイス　４５（４５　Ｓｐｉｎｅｌｌｉ　Ｐｌ．，Ｃａｍｂｒｉｄｇｅ，ＭＡ　０２１３８）のイー・インクコーポレイション（Ｅ　Ｉｎｋ　Ｃｏｒｐ．）から入手できる。電子インクは、マイクロカプセルに入ったマイクロメカニック・ディスプレイ・システムを用いる。小さなマイクロカプセルは、画素を形成するために、２つのプラスチックシートの間に捕捉される。別法として、該カプセルは表面に噴霧してもよい。結果として、フレキシブルなディスプレイ材が得られる。上記小さなカプセルは、透明であり、かつ黒いインクと白い顔料チップとの混合物を含む。電荷が該カプセルを通過する。静電荷により、該顔料チップは上部で浮遊し、あるいは各カプセルの底部で静止する。該顔料チップが上部で浮遊する場合には、表面は白く見える。該顔料チップが底部で静止する場合、すなわち該インクの下にある場合には、表面は黒く見える。２つの状態のそれぞれは、黒又は白に安定している。上記シート面を覆う透明な電磁グリッドは、画像の形を制御する。上記ディスプレイは、無線で、例えばコンピュータに接続してもよく、それに伴って、例えば、モトローラ社のページングシステムを用いてワールドワイドウェブに接続してもよい。複数のディスプレイを用いた場合、全てのディスプレイ上の文字は、ウェブページを介して単一のエディタによって一度に変更することができる。

【００３３】

表示を変更するために上述の方法のいずれかを用いることができるディスプレイは、凹部２１０内のベース部２００あるいは挿入部３００の上に面している底面上等のフロアマットのいずれかの部分と関連付けることができる。別法として、該ディスプレイは、上記ベース部又は挿入部のいずれかと一体形成することができる。該ディスプレイは、粘着性の表面及び非粘着性のフロアマットの実施形態を含むフロアマットを含む、本発明のフロアマットに対する、本願明細書に記載した実施形態のうちのいずれかにおいて使用することができる。

【００３４】

ベース部２００についてさらに説明すると、上述したように、ベース部２００は、水散逸部材及び緩衝部材を共に有してもよい。該水散逸部材は、フロアマット１００の上に立っている人の靴底から水分を移して清浄可能な挿入部に伝わる水分含量を低減することができ、また上記緩衝部材は、人の靴底に付着しているより多くのくずをフロアマット１００によって取り除くことができるように、フロアマット１００を人の靴底の形に適合させることができる。本発明は、水散逸部材及び緩衝部材のための特定の構造または材質に限定されない。例えば、該水散逸部材は、ポリアミド、ビニル及びポリイソプレン等の様々な公知の材料で構成することができる。該水散逸部材が、水を散らし、または除去して水を保持しないことは望ましいが、必要なことではない。従って、親水性の物質ではなく、多孔性の物質が望ましい。上記緩衝部材は、例えば気泡ゴムを含む様々な緩衝部材で構成することができる。

【００３５】

図２はさらに、清浄可能な挿入部３００を示す。図を見て分かるように、清浄可能な挿入部３００は、大きさが相補的で、かつベース部２００内に形成される凹部２１０の一部をなす幾何学的形状を有する。従って、清浄可能な挿入部３００は、凹部２１０内にしっか

りと収容することができる。すなわち、清浄可能な挿入部３００は、凹部２１０の長さL_1よりもわずかに短い長さL_2を有する。同様に、清浄可能な挿入部３００は、凹部２１０の幅W_1よりもわずかに短い幅W_2を有する。

【００３６】

例えば、凹部２１０の底部を画定する面と接触する面である、清浄可能な挿入部３００の底部側３１０上には、清浄可能な挿入部３００を凹部２１０内でベース部２００に取外し可能に取付けることができるように、取付け機構を設けてもよい。例えば、フック及びループ係合アセンブリ又は接着剤を含む様々な種類の取付け機構を清浄可能な挿入部３００の底面に設けることができる。清浄可能な挿入部３００を取外し可能にベース部２００に取付けるために使用する特定の固定機構にかかわらず、本実施形態においては、清浄可能な挿入部３００は、使用者が清浄でき、かつ清浄面がフロアマット１００に提供されるように、清浄後に凹部２１０内に再挿入できるように、ベース部２００から取外すことができる。

【００３７】

上述したように、清浄可能な挿入部３００は、アクリル酸を含む親水性脂肪族アクリル酸ポリマー及び共重合体、ヒドロキシエチルメタクリレート、およびグリセリンモノメタクリレート等の透明な材料で形成することができる。透明な材料からなる清浄可能な挿入部３００を形成すると、上述したように、フロアマット１００に表示できるカスタマイズされたグラフィックを人が見ることができるようになる。別法として、挿入部３００は不透明でもよい。

【００３８】

また、清浄可能な挿入部３００の上面は、粘着性の表面を有してもよい。該粘着性の表面は、清浄可能な挿入部３００の上に立っている人の靴底からゴミを取り除く際に、補助することができよう。清浄可能な挿入部３００の上部の粘着性の表面が、使用者が挿入部３００を清浄することを望む程度に汚れた場合、本実施形態においては、該使用者は、挿入部３００をベース部２００から取外し、挿入部３００を清浄して溜まったごみを除去する。そして、挿入部３００は、ベース部２００内に再挿入される。

【００３９】

清浄可能なの挿入部３００の上面に設けられる粘着性の表面は、適当な可塑剤と化合させたポリビニル塩化物、可塑化したネオプレン、多硫化物及びポリウレタン等の様々な物質で構成することができる。さらに、ブチルアクリレートやその多くの同族体等のアクリル樹脂を使用することができる。この場合も、本発明は、特定の物質に限定されない。上記粘着性の表面は、一般に、接着剤で形成することができる。本実施形態における唯一の考慮すべきことは、該表面が、繰り返し洗浄された後でも、その粘着性の特性を維持すべきであるということである。

【００４０】

本発明は、挿入部３００を清浄する特定の方法に限定されない。挿入部３００は、挿入部３００のための特定の材料化合物により、種々の方法のうちのいずれかにより清浄することができる。例えば、挿入部３００は、該挿入部３００を洗浄機械に入れて洗浄することができ、あるいは、挿入部３００は、洗濯ブラシ、石鹸及び水によって、あるいは「スピックアンドスパン」等の洗浄剤によって挿入部３００をこすり洗いすることにより洗浄できる。

【００４１】

また、挿入部３００は、ローラの周りに粘着性の表面を含むローラを用いて清浄することができる。該ローラの粘着性の表面は、該ローラの粘着性の表面が上記挿入部の粘着性の表面上を回転したときに、粘着性の挿入部上のどのようなほこり及びくずも該粘着性の挿入部から離れて該ローラに付着するような、上記粘着性の挿入部の粘着物よりも強力な粘着物で構成される。このようにして、粘着性の表面を有するローラは、粘着性の挿入部を清浄するために用いることができる。

【００４２】

しかし、この場合にも同様に、本発明は、挿入部３００を清浄する特定の方法または洗浄剤に限定されず、また、挿入部３００の化合物に適合するどのような清浄方法または薬剤も意図されている。

【００４３】

フロアマット１００はフロアマット１００上に立っている人の靴底を清浄する際に助けになるさらなる特徴も有する。例えば、ベース部２００および／または挿入部３００は、抗菌性化合物及び殺菌用化合物を含んでもよい。ポリエチレングリコールモノメタクリレート及びポリエチレングリコールジメタクリレートからなるアントラキノン誘導体等の抗菌化合物を用いることができる。従って、フロアマット１００は殺菌性になる。上記抗菌性の特徴は、該フロアマットは、人の靴底からの構造物質のくずを清浄すると共に、該人の靴底からの有害かもしれない細菌を除去することができるので、特に望ましいものである。

【００４４】

また、特定のエリアに入る前に、望ましい靴底面を実現するために、フロアマット１００は、芳香剤も備えることができる。例えば、リモネン酸などの、芳香族置換または有機エーテルを有する三環分子等のフラボンを使用することができる。該芳香剤は、好ましくない臭気が該芳香剤で都合よく遮断されるように、フロアマット１００から人の靴底へ移る。

【００４５】

本発明は、抗菌性組成物、殺菌性組成物および／または芳香剤をフロアマット１００に使用することに限定されない。フロアマット１００は、人の靴底を清浄する際に助けになる他の種々の物質を混合することもできる。

【００４６】

抗菌性組成物、殺菌性組成物、芳香剤、あるいは他の組成物をフロアマット１００と関連付けるために、種々の構造または方法を用いることができる。上記物質は、分離可能又は散逸可能なコーティングとしてフロアマット１００に適用でき、あるいは、圧力がフロアマット１００に加わったときに、上記物質が人の靴底に供与されるように、例えばペレットとしてフロアマット１００の構造中に分離可能に埋め込むことができる。

【００４７】

図３は、フロアマット１００の代替の実施形態を示す。図３においては、ベース部２００が、水散逸部材２３０及び緩衝部材２４０のための独立した層を含んでいることが描かれている。水散逸部材２３０は、この実施形態においては、緩衝部材２４０の上面に配設されている。しかし、本発明は、水散逸部材２３０及び緩衝部材２４０に対するこの特定の実施形態に限定されない。例えば、水散逸及び適合構造を共に実現できる物性を含むベース部２００に対しては、単一のハイブリッド構造を用いることができる。

【００４８】

別法として、図４は、上記フロアマットが、水散逸部材又は芯層と、吸水層との両方を有してもよいことを示している。図４においては、フロアマット４００は、芯層４１０と、吸水層４２０とを有する。芯層４１０は、ポリプロピレン又はオレフィン、あるいは、水をフロアマット４００の表面から除去する特性を有する他の適当な材料で構成することができる。吸水層４２０は、芯層４１０のすぐ下に設けられ、芯層４１０を通過する水を吸収する。吸水層４２０は、定期的に取り外して、例えば、乾燥機によって乾燥させることができる。言うまでもなく、芯層４１０は、他の実施形態において上述したように、吸水層４２０及び緩衝層と共に使用することができ、あるいはそれらがなくても使用することができ、また吸水層４２０は、芯層４１０及び緩衝層と共に使用することができ、あるいはそれらがなくても使用することができる。さらに、上記芯層および／または上記吸水層および／または上記緩衝層は、粘着性の部分と共に使用することができ、あるいは該部分がなくても使用することができる。

【００４９】

図３に戻って説明すると、図３は、挿入部３００に対する代替の実施形態も示している。

上述した挿入部３００に対する実施形態は、粘着性の表面をその上面に有することができる単一構造部材として説明したが、図３の挿入部３００に対する実施形態は、複数の層で構成されている。図を見て分かるように、層３０１～３０５は、挿入部３００を備える。該層の各々は、挿入部３００に対して上述したように、その上面に粘着性の表面を含んでもよい。使用時には、最上層、例えば層３０１は、隣接する下の層、例えば層３０２から取り外すことができ、また、独立して清浄することができる。清浄後、該層は、挿入部３００の露出した層の上面で、凹部２１０内に再び取付けることができる。このようにして、挿入部３００は、最上層を取外し、該層を清浄し、該層を凹部２１０内に再び取付けることにより、清浄することができる。各層は、独立して清浄可能であると説明したが、個々の層は、清浄可能である必要はない。各層は、上記挿入部に対する図１及び図２の実施形態を説明したときに上述したような材料で構成することができる。

【００５０】

挿入部３００に対する別の代替実施形態が意図されている。例えば、前述の開示した実施形態は、挿入部３００を、上記層の上面に粘着性の表面を有する、１つまたは２つの層で構成するように論じたが、挿入部３００が、その上面の唯一の粘着性の表面によって形成される必要はない。具体的には、挿入部３００に対する代替の実施形態は、材料の全断面にわたって粘着性である材料によって、挿入部３００を単一の構造部材として形成することを含む。この実施形態の挿入部に対しては、非架橋親水性の熱可塑性樹脂、好ましくは、ｎが１５を超えないポリエチレングリコールジアクリレートと、ポリビニルネオプレン塩化物等の疎水性材料との混合物のような材料を使用することができる。挿入部３００を均質な粘着性材料から形成することにより、挿入部３００は、清浄すべきベース部２００の凹部２１０から取外す必要はない。挿入部３００は、この代替実施形態においては、該挿入部の使用の結果として該挿入部の上面を腐食させることによって清浄することができる。従って、腐食可能な挿入部を形成することにより、該挿入部は、該挿入部がフロアマット１００内で使用されたときに、その上面の腐食により清浄することができる。

【００５１】

挿入部３００が腐食するにつれて、挿入部３００の露出面は、その均質な断面のため、粘着性であり続ける。該露出した粘着性の表面が腐食するにつれて、該露出した粘着性の表面により捕獲された汚れは、上記腐食の結果として散逸し、それに伴って該挿入部自体の腐食は、清浄可能な挿入部を形成する。

【００５２】

別法として、挿入部３００に対して均質な断面の粘着性物質を設けても、使用者は、挿入部３００を凹部２１０から取外して挿入部３００を単独に清浄してもよい。すなわち、使用者は、挿入部３００の清浄のための挿入部３００の腐食特性を単にあてにする必要はなく、該使用者はむしろ、該挿入部の腐食可能な洗浄特性を、該挿入部をベース部から取外して独立して該挿入部を清浄するという独立した清浄工程と組み合わせて利用してもよい。

【００５３】

上述したように、挿入部３００は、清浄可能であり、かつ侵食性及び再使用が可能であるかまたは可能でない、粘着性のプラスチック、紙または粘着物等の材料を含む種々の物質で構成することができる。紙を用いた場合、上記挿入部は、上述したように、単一の構造部材または複数の層として構成することができる。さらに、紙は、その上面に粘着性の表面を含んでもよい。該紙は、半透明、不透明あるいは色付けされていてもよく、また、その紙面上にグラフィック表示を含んでもよい。

【００５４】

上述したように、上記フロアマットが、水散逸および／または吸水能力を含むことは、望ましいが必須ではない。この能力は、上記挿入部の粘着性の表面が過度に濡れて滑りやすくなることを防ぐのを補助することが望ましい。使用者が上記挿入部の粘着性の表面上で滑るのを防ぐことを補助するために、水散逸および／または吸水能力を上記フロアマットに付与して上記粘着性の表面上の湿度を低減することを論じてきたが、これは、上記粘着

性の挿入部が滑りやすくなることを防ぐために意図された唯一の構造ではない。別法として、該粘着性の挿入部自体は、滑りを防ぐのを補助するように形成することができる。図５～１２及び２３～２７は、粘着性の挿入部３００に対する代替実施形態を示す。図５は、非粘着性の材料で構成することができるチャネル部３２２の格子パターン３２０を含む、粘着性の挿入部３００を示す。該チャネル部は、挿入部３００の表面から隆起した形、あるいは該挿入部の表面と同一平面上に存在する形とすることが可能である。非粘着性の材料からなる上記チャネル部を形成することにより、挿入部３００の粘着性材料が濡れた場合でも、使用者は、濡れたときに滑りやすくならない非粘着性の表面の存在によって、上記挿入部の滑りやすい濡れた粘着性の表面上で滑ることを補助されないであろう。

【００５５】

図６及び７は、粘着性の挿入部の上面３３０上に広がる、滑り止め粒子３２４、例えば、シリコン又は砂の粒子を含む粘着性の挿入部３００に対する他の代替実施形態を示す。上記滑り止め粒子が、濡れたときに滑りやすくならない材料で構成され、かつ該滑り止め粒子が、該粘着性の表面から露出されていることが好ましいが、これは必須ではない。該滑り止め粒子が上記粘着性の表面に埋め込まれている場合でも、上記粘着性の挿入部の上面３３０上での該粒子の付加部分は、上記フロアマット上に立っている人の靴底に対する滑りに対して物理的摩擦的抑制力は実現できる。

【００５６】

図５は、非粘着性の材料で構成できるチャネル部３２２の格子パターン３２０を含むように粘着性の挿入部３００を描き、また図６及び７は、上記粘着性の挿入部の上面３３０上に広がる滑り止め粒子３２４を含む粘着性の挿入部３００に対する他の代替実施形態を示すが、これらの２つの代替実施形態が、互いに両立しない特徴を含むことは、必ずしも必要ではない。例えば、図に具体的に示さないが、容易に理解できるであろうことである、粘着性の挿入部３００が、非粘着性のチャネル部からなる格子パターンと、滑り止め粒子とを共に有することができることも意図されている。

【００５７】

滑り止め用の粘着性部分を実現するための他の代替実施形態は、上記粘着性部分の表面の上方に貫通して、および該表面のわずかに上に広がる、複数のスリップ防止部材、またはトレッドまたは突起部を有することである。図８を見て分かるように、この実施形態においては、粘着性の部分３００は、吸水縁部５００であってもよいベース部内に挿入され、また複数の開口部３４２を内部に有する。粘着性の部分３００の下に配設されたベースから上方に伸びていてもよい複数のトレッド３４４の各々は、複数の開口部３４２のうちの一つを通って上方に伸びている。各トレッドの最上端部は、粘着性の部分３００の最上面３４０の上に伸びている。トレッド３４４の量及び位置決めは、人が粘着性の部分３００の上を踏んだ際に、上記粘着性の部分が、人の靴からくずを取り除くことができ、また少なくとも一つが人によって踏みつけられているトレッド３４４が、人が粘着性の部分３００上で滑ることを防ぐようになっている。トレッド３４４は、該トレッドの最上端部が、粘着性の部分３００の最上面３４０と同一平面になるように、踏みつけられたときに圧縮されてもよい。このようにして、該トレッドは、人の靴と接触して滑りを防ぐ上に、人の靴と上記マットの粘着性の表面との接触を妨げず、それにより人の靴の清浄性を向上させる。そのため、上記トレッドが上記粘着性の部分の最上面の上に広がる広がりと、上記トレッドの圧縮性との間には関連、すなわち上述の相関性をもたらす関連がある。

【００５８】

上記トレッドは、どのような形状及び大きさにも形成することができる。また該トレッドは、例えばゴムやプラスチック等の、濡れたときに滑りを防止するどのような材質でも構成することができる。該トレッドは、人が上記粘着性の部分上で滑ることを防止する際に、さらに補助するために溝部を有してもよい。

【００５９】

図９及び１０は、濡れるかもしれない粘着性の部分上で滑ることを防ぐことを補助する、粘着性の挿入部３００及びベース部２００に対する追加的な代替実施形態を示す。図９を

見て分かるように、また上述したように、粘着性の挿入部３００は、複数の層３０１、３０２及び３０３で構成されている。３つの層のみを図示しているが、本発明においては、どのような数の層でも使用することができることを理解できよう。図を見て分かるように、粘着性の層３０１～３０３はそれぞれ、複数の一体形成された隆起部３００Ａを含む。これらの隆起部は、該隆起部により上記粘着性の層の上面と人の靴との間の摩擦性を増大させることにより、該粘着性の部分上で人が滑るのを防ぐことを補助できる。従って、これらの隆起部は、該粘着性の部分が濡れた場合に、該粘着性の部分上で滑る可能性を実質的に低減することができる。

【００６０】

隆起部３００Ａは、種々の方法で各層に形成することができ、また本発明は、特定の方法に限定されない。該隆起部を形成する一つの方法は、該層を層のパッドに組立てた後、パッド全体をプレスすることである。プレスした一方の面は平坦であり、また他方の面、例えば、該層の非粘着性の面または下側に面している面は、突起部又はバンプの配列を含む。上記パッドがプレス機でプレスされると、粘着性層の全ては、プレス面にパターンを有する状態でエンボス加工され、上記パッドの各粘着性層に隆起部又はエンボス加工された部分が形成される。すなわち、各エンボス加工された部分は、各層に一体形成され、かつ各層の下側または非粘着性面のへこみと、各層の下側又は粘着性面上の隆起部とで構成されている。

【００６１】

上述した隆起部を形成するための方法においては、理解できるように、各層の該隆起部は、各他の層の隆起部と整列している。該層が互いに積み重ねられたときにその形状を容易に維持できるように、各層の該隆起部が整列していることが好ましいが、必ずしも必要ではない。

【００６２】

図１０に示すように、ベース部２００もまた上記エンボス加工された層と相補的に形成することができる。粘着性の層３００を収容する、ベース部２００の凹部の底部を画定する表面２００Ａは、隆起部２００Ｂと共に形成することができる。これらの隆起部は、上記粘着性の層における隆起部と整列するように配置される。すなわち、表面２００Ａ上の隆起部２００Ｂは、上記層がベース部の凹部内に挿入されたときに、最下の粘着性の層におけるへこみ内に配置される。これらの隆起部は、理解できるように、特に、上記最下層のみが上記フロアマット内に残る場合に、上記隆起部を上記粘着性の層内に保持して維持するのを補助する。しかし、本発明を実施する場合に、上記ベース部が隆起部と共に形成されることは、必ずしも必要ではない。上記層は、上記ベース部が相補的な隆起部を有していようがいまいが、隆起部と共に形成することができる。

【００６３】

粘着性の部分に対する他の代替実施形態においては、該粘着性の部分もまた、水散逸能力を有することができる。該粘着性の部分は、該粘着性の部分の表面から水分を散逸する際に補助する疎水性の多孔性構造で構成することができる。

【００６４】

図１１及び１２は、上記粘着性の部分のための水散逸能力を実現できる、本発明のフロアマットに対する代替の実施形態を示す。図１１の実施形態もまた、人が、濡れるかもしれない粘着性の部分上で滑るのを防ぐことを補助する。

【００６５】

図１１は、粘着性の部分の粘着性の層３０１及び３０２がその中に複数の開口部３００Ｃを画定している粘着性部分３００に対する一実施形態を示す。各層の上記開口部は、各層の開口部と互いに位置合わせされている。従って、上記層において位置合わせされた開口部のため、上記粘着性部分は、該粘着性部分の最上面から、または該粘着性部分上に立っている人の靴底から、該開口部を介して、上記層がその内部に配設されるベース部へ表層の水を排水することができる。該ベース部は、上述したように、上記粘着性部分から上記開口部を介して排水された上記表層の水を移動させる、および／または吸収する、水散逸

部材および／または吸水要素を有してもよい。

【００６６】

また上記開口部は、上記表面から表層の水を排水することによってだけではなく、上記層を踏んでいる人の靴と該層自体との摩擦接触を強めることによって、該層の濡れた表面上で滑るのを防止することを補助することができる。上記開口部は、人の靴と上記層との摩擦接触を強める不連続性を該層の方面にもたらす。上記開口部を画定する、上記層の表面の縁部は、この強められた摩擦接触を実現する。人の靴は、上記縁部と係合し、それによって該靴に対する摩擦接触が強められる。さらに上記開口部は、例えば吸引カップのような、人の靴の底に対する吸引部として作用する。人の靴に対して該開口部により生じるこの吸引もまた、上記層の表面上での滑りを防ぐことを補助する。

【００６７】

図１２は、上記粘着性部分の水散逸能力を備える、本発明のフロアマットに対する他の実施形態を示す。図を見て分かるように、粘着性部分３００は、層３０１及び３０２を有する。ベース部２００は、層３０１、３０２が配設される凹部を画定する。該凹部の底部を画定する上記ベース部の表面は、該凹部の中心位置またはその近傍に隆起部分２００Ｃを有する。すなわち、該ベース部の隆起部分２００Ｃは、上記層のそれぞれに隆起部分を形成する。図を見て理解できるように、該層に形成された隆起部分は、該層から該層上の表層水を散逸させるように作用する。該表層水は、該隆起部分により、重力によって該層から排水される。

【００６８】

ここでも同様に、図１１及び１２の実施形態においては、いずれかの複数の層を、粘着性部分３００に設けることができる。

【００６９】

本発明においては、滑石粉等の吸水パウダーを使用できることも意図されている。滑石粉は、上記フロアマットと一体化するか、あるいは該フロアマットと別のものとして結合することができる。滑石粉は、該滑石粉及び上記粘着性挿入部に踏み入った人が、その後該人の靴から該粉に加えて靴底の汚れを除去し、該人が該粘着性挿入部を次に踏みつけるときに、靴底から水分を取り除く。

【００７０】

本発明はまた、上記粘着性部分又は該粘着性部分内の層を取外して清浄する時期を判断するための装置及び方法を提供する。該粘着性部分は、該粘着性部分を踏みつける人の靴底から汚れを取り除くことを助けるので、どの人の靴も例外なく汚れていると仮定すれば、該粘着性部分またはその層は、相当数の人が踏んだ後に汚れることになる。従って、人が汚れた粘着性部分をいつ取外して清浄するかを判断するのを補助することが好ましい。上述したように、ここでも同様に、この判断は、一定数の人が上記フロアマットを踏んだ後に行われる。すなわち、図１３に示す本発明の一実施形態は、フロアマット１００上の人の存在を検知するセンサシステム７００を有する。センサシステム７００は、ベース部２００および／または粘着性部分３００上の人の存在を検知する。ベース部２００を踏む人は、粘着性部分３００も踏むと仮定するので、上記どちらかの部分上での人の存在を検知することは、本発明を実施するのに十分である。

【００７１】

センサシステム７００は、センサ７１０と、センサ７１０と接続され、かつ人が見ることができるようにマット１００上に配設された、例えばＬＥＤ等の表示装置７２０とを有する。電池等の電源は、上記フロアマットの下側に設けることができる。上述したように、センサ７１０は、マット１００上、例えば本実施形態においては粘着性部分３００上での人の存在を検知する。該センサは、様々な装置および方法のうちのいずれかを用いて上記人の存在を検知することができ、また、該マット上に立っている人の体重によって、あるいは、人の動きによる該マットの表面を横切る動きを検知することによって、該マットに加わる圧力を検知することを含み得る。すなわち、圧力センサ及び行動探知器を本発明に用いることができる。またセンサシステム７００は、検知した存在の数を計数することに

よって、マット１００を踏んだ人の数を判断する。該存在数が所定の存在数と等しくなると、表示装置７２０に信号が送られて、上記粘着性部分を取外して清浄すべきことを示すＬＥＤを、例えば点灯させる。本発明は、検知した存在が特定数に達したときに上記粘着性部分を取外すことに限定されず、また、該所定数は、上記マットが使用される特定の環境状態に基づいて調節することができる。もちろん図を見て理解できるように、汚れた粘着性部分又は層を取外しおよび／または清浄した後、上記センサシステムは、新たに清浄されたまたは露出された層上での存在の総数を計数し始めるようにリセットすることができる。

【００７２】

警報装置７２０は、目に見える、聞こえるあるいは震動性の信号のいずれかを生成することができ、また本発明は、特定の種類の信号を生成することに限定されない。例えば、目に見える信号は、上記フロアマットが清浄すべき時に点灯し、かつ上記フロアマットが清浄を要しないときに点灯されない光で構成することができる。別法として、該光は、それぞれの色が、上記フロアマットに対するきれいさの異なる状態を表わす、複数の異なる色のうちの一つで連続的に点灯することができる。例えば、緑色光は、上記マットが清浄する必要のないことを表わすことができる。黄色光は、該マットが、まもなく清浄を要する汚れの状態に達しつつあることを表わすことができる。点滅させることができる赤色光は、上記フロアマットを清浄する時期であることを表わすことができる。

【００７３】

本発明のセンサシステムは、開示された実施形態と共に、挿入できるまたは挿入しない清浄可能な部分であって、かつ層及び粘着性の表面を含むまたは含まない清浄可能な部分と、ベース部分とに対して用いることができる。

【００７４】

清浄可能な部分３００は、挿入部として説明してきたが、清浄可能な部分３００がフロアマット１００に挿入されることは必ずしも必要ではない。清浄可能な部分３００をフロアマット１００と関連付ける代替の可能性は多数ある。例えば、清浄可能な部分３００は、ベース部２００の上部に配置することができ、またはベース部２００に隣接して配置することができる。本発明は、清浄可能な部分３００に対する実施形態のうちのいずれかをベース部２００内に挿入することに限定されない。

【００７５】

例えば、図１４は、上述したように独立している、水散逸部材、吸水要素及び緩衝部材を含む、粘着性部分３００及び非粘着性部分２００を示す。図１４を見て分かるように、粘着性部分３００は、吸水性、水散逸性であってもよい境界部５００と接していてもよく、また複数の開口部３４２及びトレッド３４４を含んでもよい。粘着性部分３００は、上述の実施形態のうちのいずれかを含むことが可能である。連結層６００は、粘着性部分３００及び非粘着性部分２００の両方の境界部５００の下側に位置している。境界部５００および／または非粘着性部分２００は、連結層６００と分離可能に連結することができる。従って、連結層６００によって、境界部５００、粘着性部分３００及び非粘着性部分２００が、互いに分離・連結可能になっている。このようにして、例えば、非粘着性部分２００を人家の外側でフロントポーチに配置し、粘着性部分３００を人家の内側に配置することが可能になる。

【００７６】

連結層６００は、種々の材料のうちのいずれかで構成できる。該連結層は、上記フロアマットの第１の部分を該フロアマットの第２の部分に分離可能に連結できることが要求される。例えば、Ｖｅｌｃｒｏ（登録商標）のようなフック及びループ係合アセンブリを、上記連結層上の該アセンブリの第１の部分、上記フロアマットの第１の部分の下側における他の部分及び上記フロアマットの第２の部分に使用することができる。別法として、上記フロアマットの上記２つの部分を分離可能に上記連結層に連結するために、接着剤を用いることができる。さらに、雄／雌コネクタタイプのスナップを、上記２つの部分を上記連結層に連結するために使用することができる。

【００７７】
図１５は、本発明のフロアマット１００の一実施形態を用いた場合の最初の経過段階を示す。上述したように、フロアマット１００の実施形態は、ベース部２００と挿入部３００とを有する。図１５を見て分かるように、また上述したように、図１５の実施形態には、図１、２の実施形態に示したものと異なるグラフィックの表示部２２０がある。すなわち、図１５では、グラフィック２２０内に、スマイルマークと共に「Ｈｅｌｌｏ」というメッセージが表示されている。
【００７８】
図１５を見て分かるように、本発明の実施形態を用いる場合、使用者は、まずベース部２００の上を踏む。上述したように、ベース部２００は、水散逸部材および／または吸水要素を含んでもよく、従って、人の靴底から水分を除去する際に補助することができる。また上述したように、一実施形態においては、ベース部２００は緩衝部材も有するので、ベース部２００は、人がベース部２００を踏んだ際に該人の靴底に順応する。図１５には示されていないが、上述したように、抗菌性組成物、殺菌性組成物、芳香剤、あるいは他の清浄物質を、フロアマット１００と関連付けることができ、また人がフロアマット１００に圧力を加えたときに該人の靴底に適用できる。
【００７９】
図１６を見て分かるように、本発明を用いた場合の第２の経過段階では、人が、フロアマット１００の挿入部３００を踏んでいる。上述したように、挿入部３００は、人の靴底からくずを取り除くときに補助するための粘着性表面をその上面に有してもよい。また、抗菌性組成物、殺菌性組成物、芳香剤、あるいは他の清浄物質も、人の靴底に与えるために挿入部３００に含ませることができる。
【００８０】
人が挿入部３００を踏んだ後に、使用者は、フロアマット１００から降りる。上述したように、フロアマット１００は、挿入部３００に汚れが蓄積した後に、上述のいずれかの方法によって清浄することができる。挿入部３００は、ベース部２００から取外して清浄することができ、清浄または廃棄すべき層は、挿入部３００から取外すことができ、あるいは挿入部３００は、挿入部３００の腐食によって清浄することができる。本発明は、フロアマット１００の挿入部３００を清浄するための特定の方法に限定されない。
【００８１】
図１７～図２２は、本発明のフロアマットに対するさらに別の代替実施形態を示す。図１７を見て分かるように、該フロアマットに対するこの実施形態においては、フロアマット１７００は、清浄可能な部分１７１０と複数のベース部１７２０Ａ～１７２０Ｄとを有する。図を見て分かるように、清浄可能な部分１７１０は、ベース部１７２０Ａ～１７２０Ｄのうちの一つの中に位置している。このようにして、フロアマット１７００は、種々のベース部１７２０Ａ～１７２０Ｄのうちの一つと共に、清浄可能な部分１７１０を交換することによって、特定の使用者に対してカスタマイズすることができる。ベース部１７２０Ａ～１７２０Ｄは、様々な物理的形態のうちのいずれかで形成することができ、また様々なテーマ、グラフィックまたは色のいずれかを含むことができる。従って、共通の清浄可能な部分１７１０は、種々のベース部１７２０Ａ～１７２０Ｄと共に使用することができる。
【００８２】
図１８～図２０は、本発明の原理によるフロアマット１８００に対する別の代替実施形態を示す。図１８を見て分かるように、フロアマット１８００もまた、清浄可能な部分１８１０とベース部１８２０とを有する。上述したように、清浄可能な部分１８１０は、ベース部１８２０内に収容される。この実施形態においては、清浄可能な部分１８１０は、単一のシート１８１０Ａで構成されている。単一のシート１８１０Ａは、その上面が粘着性でもよく、また上述したように、滑り止め突起を収容するための開口部を有してもよい。この実施形態においては、単一のシート１８１０Ａは、汚れたときに、取り除いて他のシートと交換することができる。

【００８３】
図１９は、複数のシート１８１０Ｂ～１８１０Ｄを、互いにつないでシートのロール１８３０に丸めることができることを示す。該シートは、該シートのロールから１枚のシートを容易に分離できるように、ミシン目を入れた接合部で互いに接合することができる。図を見て理解できるように、残りのシートのロールから１枚のシートを分離した後、ベース部１８２０に該シートを挿入することができる。
【００８４】
図２０は、シート１８３０のロールを、例えば、シート１８３０のロールをキャビネットドア上に装着することにより、上記フロアマットの近くに配設することが可能な保管装置１８４０に保管することができることを示す。このようにして、交換用シートは、使用に対して容易に配置され、保管される。
【００８５】
別法として、上記シートをロール上に配置して該ロールをキャビネット内に保管する代わりに、該シートを平らなパッケージを形成するように互いに折り畳むこともできる。該シートのパッケージは、フロアマット１８００の下に保管することができ、必要なときに、Ｋｌｅｅｎｅｘ（登録商標）ティッシュを１枚取るのと同じ方法で、該フロアマットの下の該パッケージから個々のシートを取ることができる。
【００８６】
図２１は、本発明によるフロアマットに対する別の代替実施形態を示す。フロアマット２１００は、清浄可能／こすることが可能な部分２１１０と、ベース部２１２０とを有する。この実施形態においては、この出願において上述したように、清浄可能な部分２１１０は、材料の全断面にわたって粘着性である材料によって、単一構造部材として形成されている。また上述したように、部分２１１０を均質で粘着性の物質で形成することにより、部分２１１０は、清浄すべきベース部２１２０から取外す必要はない。しかし、上述した実施形態においては、清浄可能な部分２１１０は、上記挿入部の使用の結果として該挿入部の上面が摩耗することによって清浄することができる。図２１の実施形態においては、該清浄可能な部分は、スクレーパー２１３０を用いることによって、２～３ミクロン程度の厚さの上面を清浄可能な部分２１１０からこすり取ることによって清浄される。
【００８７】
スクレーパー２１３０は、様々な構造を有することができるが、清浄可能な部分２１１０から表面を除去することができることが必要である。例えば、鈍い刃、かみそりまたはかんな等のどのような種類のこすり取り面でもスクレーパー２１３０に用いることができる。
【００８８】
スクレーパー２１３０は、軌道２１４０、２１４５上で移動可能である。軌道２１４０、２１４５は、清浄可能な部分２１１０及びベース部２１２０に隣接している。スクレーパー２１３０は、軌道２１４０、２１４５における例えば溝部等の相補的構造に収容される、例えばピンなどの車輪又は他の構造を有してもよい。従って、スクレーパー２１３０は、軌道２１４０、２１４５上で清浄な部分２１１０を横切って移動可能である。スクレーパー２１３０は、清浄な部分２１１０を横切って移動可能であるスクレーパー２１３０の部分上にこすり取り面を単に有してもよい。また、２つの軌道を用いることは、必ずしも必要ではない。上記スクレーパーは、単一の軌道内を移動可能である。
【００８９】
スクレーパー２１３０は、使用者の足を使って該スクレーパーに引っ掛けて上記軌道上のスクレーパーを移動させることを含む様々な方法のうちのいずれかによって移動させることができる。
【００９０】
またフロアマット２１００は、軌道２１４０、２１４５の一方または両端に設けることができるごみ止め２１５０を有する。ごみ止め２１５０は、スクレーパー２１３０が上記清浄可能な部分をこすり取った後の清浄可能な部分２１１０からのくずがその中に入れられ

る凹部を有する。スクレーパー２１３０は、該くずを該清浄可能な部分からごみ止め２１５０内へ移動させる。上記清浄可能な部分から上記ごみ止め内へ入れられたくずは、例えば、該くずを上記ごみ止めから吸引することにより、あるいは、着脱可能なごみ止めを取外し、該ごみ止めから内容物を捨てて該ごみ止めを元に戻すことによる等の様々な方法のうちのいずれかの方法で、該ごみ止めから除去することができる。

【００９１】

図を見て分かるように、上記清浄可能な部分がこすり取られるにつれて、上記スクレーパーは、上記清浄可能な部分にかみ合う該スクレーパーの表面が、該清浄可能な部分とかみ合ったままであるように、軌道２１４０、２１４５に対して同一水準で低くなっている。従って、例えば該スクレーパーは、該スクレーパーが上記フロアマットの全幅にわたって移動するときに、ラチェット機構が該スクレーパーを低くさせるように該スクレーパーが該ラチェット機構を作動させるようなラチェット機構に装着することができる。別法として、上記スクレーパーは、上記軌道に対して同じ相対位置にとどまることができ、また該軌道は、上記ベース部及び清浄可能な部分に対して徐々に下げることができる。さらに、上記スクレーパーの刃面は、該刃が、上記清浄可能な部分及び上記ベース部に対して移動されても、該スクレーパーが、上記軌道、清浄可能な部分及びベース部に対して同じ相対位置に留まるように、該スクレーパーの構造に対して下げることができる。

【００９２】

また、ベース部が、フロアマット２１００に対する実施形態において使用されることは、必ずしも必要ではない。上記清浄可能な部分は、単独で、該清浄可能な部分に隣接する上記軌道及び該軌道上で移動可能な上記スクレーパーと共に用いることができる。ごみ止めもまた使用できる。すなわち、図２２は、ベース部を用いない清浄可能な部分２２１０を有するフロアマット２２００に対する一実施形態を示す。清浄可能な部分２２１０は軌道２２４０、２２４５に隣接している。スクレーパー２２３０は、軌道２２４０、２２４５上で移動可能である。ごみ止め２２５０は、軌道２２４０、２２４５の一方又は両方の端部に設けることができる。

【００９３】

上述したように、濡れている場合および乾燥している場合に共に粘着性であり、かついずれの状態においても粘着過ぎない粘着性の表面を実現できる公知の単一の化学的性質はない。従って、本発明のさらに別の実施形態においては、上記粘着性の表面に対して、二重の化学的性質を利用することができる。該二重の化学的性質は、２つの異なる種類の粘着性組成物を組み合わせる。一方の種類の粘着性組成物は、乾燥しているときに最適に粘着性である。他方の種類の粘着性組成物は、濡れているときに最適に粘着性である。上記２種類の粘着性組成物の組合せは、濡れているときおよび乾燥しているとき共に最適に粘着性である上部露出面を形成するのに用いることができる。従って、人の靴が上記上部露出面と接触したとき、該表面は、乾燥していても濡れていても良好な粘着性を実現でき、該表面が濡れているときに人が滑るのを防ぐことを補助する。

【００９４】

上記で使用した「最適に粘着性である」という表現は、上記２種類の粘着性組成物のどちらも、乾燥しているときまたは濡れているときに、ある程度の粘着性を保持し、一方の種類は、乾燥状態で最良のまたは使える水準の粘着性を有すると共に、他方の種類は、濡れた状態で最良のまたは使える水準の粘着性を有することを意味する。

【００９５】

上記２種類の粘着性組成物を含み、かつ靴と接触することになる上部露出粘着性面をもたらす材料は、様々な実施形態を採用できる。例えば、上記二重の化学的性質の上部露出粘着性表面は、上述した、非粘着性ベース部と協働するように設計された挿入部３００のような粘着性の「挿入部」または「部分」の表面とすることができる。

【００９６】

他方、上記二重の化学的性質の上部露出粘着性表面は、それ自体、粘着性の「挿入部」または「部分」の表面でなくてもよい。むしろ上記二重の化学的性質の上部露出粘着性表面

は、独立したフロアマットの使用可能な表面の実質的に全体とすることができる。

【００９７】

上記二重の化学的性質の上部露出粘着性表面を非粘着性部分と組み合わせて使用しようと、該表面が、独立したフロアマットの使用可能な表面の実質的に全体であろうと、スリップ防止部材のための独立した構造部材は、上記粘着性表面が濡れたときに該粘着性表面で滑ることを防ぐために、該粘着性表面と共に使用する必要はない。他方、必要に応じて、スリップ防止部材のための独立した構造部材を上記粘着性表面と共に使用することができる。

【００９８】

一般に、上記粘着性表面を呈する物質は、それぞれ乾燥しているときに最適に粘着性である、または濡れているときに最適に粘着性である化学的性質を有する構成部材の組合せを含むため、該組合せは全体として、濡れているときまたは乾燥しているときのどちらにおいても使える水準の粘着性を保持する上部露出粘着性表面を呈する。より具体的には、乾燥しているときに最適に粘着性である化学的性質を有する構成部材の粘着性が、水分の存在により低減された場合には、該粘着性の損失は、濡れているときに最適に粘着性である化学的性質を有する上記構成部材によって補償される。他方、濡れているときに最適に粘着性である化学的性質を有する構成部材の粘着性が、水分の欠乏により低減された場合には、該粘着性の損失は、乾燥しているときに最適に粘着性である化学的性質を有する上記構成部材によって補償される。

【００９９】

上記構成部材は、それぞれ乾燥しているときに粘着性である性質および濡れているときに粘着性である性質を有する交互のパターンで組み合わせることができる。該構成部材は、上記合成材料が実質的に非均質な組成物を有するような明確な特徴を有する領域に該合成材料が区分されるように、組み合わせることができる。他方、該構成部材は、微細な粒度で組み合わせることができるため、上記合成材料は、実質的に均質な組成物を有する。

【０１００】

図２３は、濡れているときまたは乾燥しているときのどちらにおいても粘着性である上部露出粘着性表面を呈する材料を含む、多層アセンブリ１０の実施可能な一実施形態を示す。該層は、濡れているときまたは乾燥しているときのどちらにおいても粘着性である上部露出粘着性表面を呈する材料を含む上部層１１を有する。上記材料は、少なくとも３種類の性質が異なる「領域」を備える。上部層１１の組成物に対する「領域」は、他の個別の構成部分と異なる性質の化学的特性を有する、該上部層の個別の構成部材を指す。

【０１０１】

上部層１１の領域は、感圧性の粘着性特性及び高表面エネルギを有する粘着性領域を有する。この粘着性領域は、例えば、アルキルメタクリレートと、アクリルアミド、エポキシアクリレート、またはウレタン基を末端にもつアクリル酸塩等の二官能性コモノマーとの共重合体と、感圧性のポリシロキサン誘導体を含むことが可能である。

【０１０２】

上部層１１の第２の領域は、低表面エネルギの非粘着性疎水性領域である。この非粘着性疎水性領域は、例えば、ポリアルキルフルオロアクリレート、アクリル基を末端にもつフルオロアクリルアミドまたはフルオロスルフォンアミド、一つ又は二つのアクリル酸塩群で誘導されたポリシロキサン、アクリル酸塩で誘導されたセルロース、スチレンブタジエン共重合体、またはアクリル酸アクリレートまたはメタクリレートを含むことができる。該メタクリレートとしては、例えば、シクロヘキサンメタクリレート、ノルボルネンメタクリレートまたはイソボルニルメタクリレート等を挙げることができる。

【０１０３】

上部層１１の第３の領域は、親水性領域である。該親水性領域は、例えば、ヒドロキシエチルメタクリレート、ポリアクリル酸及びメタクリル酸及びそれらの塩、ポリビニルアルコール、ポリオキシメチレン、ポリアミド、不飽和ジカルボン酸のポリエステル及びポリイミド等を含むことができる。

【０１０４】
上部層１１においては、上記粘着性領域及び親水性領域は、それぞれ５～２０モル％の範囲の架橋密度で架橋することができる。上記上部層の物質は、上記フロアマットが使用可能な温度範囲内において、エラストマー状態であるかまたは固い状態のいずれかにある。ガラス転移温度の好ましい範囲は、５℃～２５℃である。
【０１０５】
上部層１１においては、複数の粘着性領域中に、複数の疎水性領域が散在している。該疎水性領域は、乾燥状態における上部層１１の粘着性を、濡れた状態における上部層１１の粘着性と実質的に等しくすることにより、上部層１１の全体の粘着性を調節する。
【０１０６】
低表面エネルギの上記疎水性領域の機能は、上記上部層上に水の膜が形成されることを防ぎ、水はけをよくすることである。また上記疎水性領域は、上記上部層の粘着性の圧力依存性を高め、それにより、力が加わらないときの粘着性を低減する。これにより、上記フロアマットが実際に使用された際に圧力が加わったときの過剰な粘着性を抑制し、かつ該粘着性の表面が大量の浮遊粒状物質を集めるのを防止することを補助することができる。
【０１０７】
重合層１１の全体的な形態は、疎水性領域が実質的に該層の表面または近傍にあり、かつ親水性及び粘着性の領域が実質的に該層の表面より下にある状態のミセルである。上記親水性及び粘着性の領域は、濡れた状態において上記層に移動すると共に、履物や他の清浄すべき面から汚れ、細菌等を引き付けるのに必要な粘着性を生成して、該粘着性の表面が濡れているときに、その上で滑るのを防ぐことを補助する。
【０１０８】
上部層１１の製造においては、領域の形成は、溶媒誘導結晶体の使用によって強めることができる。上記粘着性部分の製造または組立の方法の選択により、上部層１１の押し出し成型、積層または塗布プロセスの間の上記領域の配向の選択によってさらなる向上が可能である。
【０１０９】
上述の上部層１１に加えて、多層アセンブリ１０は、少なくとも一つの疎水性層１２を含むことも可能である。その一面において、疎水性層１２は、上部層１１に隣接して設けることができる。疎水性層１２は、疎水性共重合体で形成することができる。このような疎水性共重合体の例としては、メチルメタクリレート共重合体、スチレンブタジエン共重合体、およびポリアルキルまたはポリアリルシロキサンが挙げられる。疎水性層１２は、例えば、アクリル性接着剤によって上部層１１に接合することができる。該疎水性層のガラス転移温度は、５℃～１５０℃の範囲でよい。
【０１１０】
疎水性層１２は、上部層１１から効率的に水を移動させるように設計される。疎水性層１２の組成は、水の可溶性を最少化し、かつ疎水性層１２中における拡散率を最大化するように選定される。疎水性層１２の構成部材としてのポリシロキサンは、この見地から特に好ましい。さらに、この層の好ましい機能は、水はけを良くし、比較的乾燥した状態に保つことであるため、水分があるときの疎水性層１２の膨潤特性を最少化することが重要である。
【０１１１】
上部層１１に隣接する側と反対側においては、疎水性層１２は、ポリビニルアルコール、ポリオキシメチレン、ポリヒドロキシエステルまたはアミドで形成された親水性層１３に隣接してもよい。この親水性層１３の架橋密度は、１０～３０モル％の範囲にすることができ、またそのガラス転移温度は、－３０℃～１０℃の範囲とすることができる。
【０１１２】
親水性層１３は、疎水性層１２によって移動させられてきた水を吸収することができる。親水性層１３は、隣接する層に接着接合することができる。該親水性層による水の吸水作用は、その厚みを増大させる。該親水性層の組成及び架橋密度は、この層が、その重量の

２倍の量の水まで保水できる（膨潤率２００％）ように選定される。該親水性層の機能は、散逸による水の移動が遅いときに、貯水層として作用することである。また同時に、該親水性の架橋密度及び機能性は、過度に水分を保持しないように、注意深く制御される。

【０１１３】

多層アセンブリ１０はさらに、床との接触のための底部層１４を有する。底部層１４は、ポリウレタン、スチレンブタジエン共重合体またはポリカーボネート等の耐摩耗性の滑り止めポリマーで形成することができる。底部層１４を形成するのに適当な他の物質としては、アクリル酸基を末端にもつ芳香族ポリウレタン及びエポキシドが挙げられる。底部層１４は、一般に高架橋（例えば、１０～５０モル％）であり、そのガラス転移温度は、測定可能な場合、５℃未満、およびいかなる場合であっても１０℃未満にする。底部層１４は、高表面エネルギを有するように形成することができるため、たとえ床面上に水の膜が存在する場合でも、該床面に対する全ての親和力を失うことはない。

【０１１４】

底部層１４は、多層アセンブリ１０が独立したフロアマットとして使用されている場合に、特に有用である。他方、多層アセンブリ１０が非粘着性の部分と組合わせた挿入部として使用されている場合には、底部層１４は必要ない。その代わりに、多層アセンブリ１０の非粘着性部分に対する接着性を確実にするために、該非粘着性部分に接触する親水性層１３の表面に接着剤を用いる。

【０１１５】

上部層１１は、約５０～５００ミクロンの厚さとすることができる。疎水性層１２は、約１００～１０００ミクロンの厚さとすることができ、親水性層１３は、約２５０～１５００ミクロンの厚さとすることができる。底部層１４は、約２５０～１０００ミクロンの厚さとすることができる。

【０１１６】

多層アセンブリ１０は、表面積を増すようなパターンにエンボス加工することができ、また、排水を担当する孔（直系２～１０ｍｍ）のパターンで孔を開けることができる。

【０１１７】

多層アセンブリ１０は、上述の各層を別々に製造した後、それらを従来のプロセスを用いて一緒に接合することにより組立てることができる。別法として、例えば、上部層１１を最初に製造し、その後他の層を上部層１１に逐次塗布し、または互いに接合することができる。

【０１１８】

他の代替の実施形態によれば、上部層１１は、均質な組成物を有する物質を含む。均質な組成物は、該物質が、複数の領域に分割されず、該物質の全体にわたって実質的に不変である化学的性質を該物質が有するように、微細に粒状になっていることを意味する。該化学的性質は、該物質が吸水できると共に、粘着性を保持できるようになっている。

【０１１９】

例えば、上部層１１中の均質な組成物からなる物質は、ブロック共重合体またはグラフト共重合体等の重合体で構成することができる。該重合体は、後にさらにフルオロアクリレートでグラフトされる親水性モノマーでコートまたはグラフトされた感圧性の粘着物とすることができる。別法として、上記均質な組成物からなる物質は、繊維または水と結合する微少球等の親水性フィラーを有する感圧性の粘着物の混合物を含むことが可能である。

【０１２０】

上述したように、上記多層アセンブリは、水はけを良くするために孔を開けることができる。図２４は、上述したような４つの層を備える多層アセンブリ１５に形成された孔開けパターンの一実施形態を示す。４つ全ての層を貫通して円形の孔１６が打ち抜かれ、切断されあるいは穿設されている。該円形の孔は一例として示すが、該孔は、任意の形状とすることができる。

【０１２１】

本発明の更なる実施形態は、任意のパターンに配設された２つの基本的に異なる粘着性組

成物を用いることができる。第１の粘着性組成物は、圧力に敏感でかつ乾燥しているときに粘着性であるとすることができる。第２の粘着性組成物は、親水性でかつ濡れているときに粘着性であるとすることができる。上記パターンは、上記第１の粘着性組成物と上記第２の粘着性組成物とを互い違いにした領域からなるパターンとすることができる。乾燥しているときに粘着性である粘着物の例としては、ポリマー（エチレン酢酸ビニル共重合体）及びポリビニルブチラールが挙げられる。濡れているときに粘着性である粘着物の例としては、親水コロイドゴムと、次の種類の化学的性質、すなわち、２アミノエチルアクリレート及びｎ－ブチルメタクリレートの共重合体とを混合した可塑剤が存在する、天然ゴム又は合成ゴムを含む混合物が挙げられる。

【０１２２】

図２５は、上述の基本的に異なる２つの粘着性組成物を用いた多層アセンブリ１７の断面の斜視図を示す。上部層１８は、濡れているときに粘着性である粘着物と、乾燥しているときに粘着性である粘着物とが互い違いになっているチェッカー盤状パターン１９を備える。該チェッカー盤状パターンは、一例としてのみ示すが、本発明においては、その他の互い違いのパターンも意図されている。底部層２０は、床と接触するための耐摩耗性の滑り止め層である。底部層２０は、多層アセンブリ１７が独立したフロアマットとして使用されている場合に、特に有用である。他方、多層アセンブリ１７が、非粘着性部分と組み合わせた挿入部として使用されている場合には、底部層２０は必要ない。その代わりに、該非粘着性部分と接触するための層１８の表面に接着剤が用いられる。

【０１２３】

図２６は、本発明のさらに別の実施形態を示す多層アセンブリ２１の断面の斜視図である。上部層２２は、乾燥時に粘着性である粘着物から成る。第２の層２３は、濡れているときに粘着性である疎水性粘着物から成る。底部層２４は、床と接触するための耐摩耗性の滑り止め層である。

【０１２４】

孔２５は、乾燥時に粘着性である粘着物が接触すると同時に、靴底又は他の表面による接触により、濡れたときに粘着性である粘着物によって清浄できるようにするために、上部層２２に形成されている。第２の層２３も親水性であるので、濡れたときには、該層は膨潤して孔２５を塞ぐことになり、靴底等の清浄すべき表面の、層３の濡れたときに粘着性である粘着物へのより多くの接触を可能にする。

【０１２５】

図２７は、上部露出粘着性表面となる物質が、実質的に均質な組成物を有する他の実施形態を示す。該物質は、乾燥時に粘着性である物質と、濡れたときに粘着性である物質との混合物から成る。該濡れたときに粘着性である物質としては、一定の親水コロイドゴム（例えば、グアールガム、イナゴマメゴム等）が挙げられる。これらの親水コロイドゴムは、大きな吸水性を有するので、該ゴムは、良好な濡れ接着性又は粘着性を実現できるであろう。圧力に敏感でもある、乾燥時に粘着性である物質としては、可塑剤を含む、合成および／または天然ゴムを挙げることができる。該合成および／または天然ゴムとしては、例えば、ポリイソブチレン、天然ゴム、シリコンゴム、アクリロニトリルゴム、ポリウレタンゴム、ブチルゴムエラストマー等が挙げられる。

【０１２６】

上述したような濡れたときに粘着性である物質と、乾燥時に粘着性である物質との混合物の強度及び均一性は、該混合物に、粘着性強化剤を導入することによって向上させることができる。該粘着性強化剤としては、例えば、木質セルロース、綿またはダクロン等の、一つ又はそれ以上の天然及び人工の繊維質材が挙げられる。

【０１２７】

図２７においては、多層アセンブリ２６の上部層２７は、粘着性強化剤を混ぜた、感圧性の乾燥粘着剤と親水コロイドゴムとの混合物から成る。該粘着性強化剤により、上部層２７の表面２８は、単一材からなる均質な外見を有する。底部層２９は、床と接触するための耐摩耗性の滑り止め層である。底部層２９は、層２７が挿入部として使用される場合に

は必要ない。

【０１２８】

上述したような、濡れているときおよび乾燥しているとき共に粘着性である上部露出粘着性表面となるどのような物質も、互いに組み合わせて、あるいは上述の他の層のいずれかと組み合わせて使用することができる。例えば、層１８又は２７のいずれも、疎水性層及び親水性層と組み合わせて使用することができる。

【０１２９】

上述したように、一実施形態においては、上記フロアマットは、表面領域と、濡れたときに粘着性表面で滑ることを防ぐために該粘着性表面の上部露出表面の該表面領域内に配設された実質的に非紙製のスリップ防止部材とを有する上部露出表面を有する粘着性表面を有する。すなわち、該スリップ防止部材は、上記粘着性表面の上記上部露出表面と機能的に協働して、該上部露出表面が濡れたときに、該上部露出表面を踏む該上部露出表面上の人の滑りを少なくする。該スリップ防止部材は、該上部露出表面に一体に設けることができる。

【０１３０】

該スリップ防止部材は、図５に示すように、非粘着性の物質で構成される複数のチャネル部を有してもよく、該複数のチャネル部は、該粘着性表面を踏む人に応じて、該粘着性表面の上面から伸ばせる。別法として、上記フロアマットは、該粘着性表面を踏む人がいない場合に、該粘着性表面の上面から伸ばせる上述したトレッド等のスリップ防止部材を有してもよい。従って、該トレッドは、該トレッドが該粘着性表面の上部露出表面の上に伸びる高さよりも実質的に大きな長さであって、該粘着性表面の上部露出表面を横切って伸びる長さを有する伸長した部材でもよい。

【０１３１】

また、上記スリップ防止部材は、図１１に示す開口部であってもよい。

【０１３２】

スリップ防止部材に対する種々の実施形態は、例えば、非粘着性部材や耐水性材料等の非粘着性物質で構成することができる。すなわち、該スリップ防止部材は、耐水性とすることができる。また該スリップ防止部材は、複数回の使用後でも該粘着性表面での滑りを防止する機能を維持したままであるような材料で構成することができる。従って、該スリップ防止部材は、該スリップ防止部材の外形が、人によって複数回踏まれた後にも実質的に維持されるような十分固い材質で構成することができ、また人によって複数回踏まれた後にも実質的に維持される性質を有する材質で構成することができる。

【０１３３】

上述したように、一実施形態においては、上記フロアマットは、人の靴底をその上に接触させるための非粘着性露出表面領域２５０を有するベース部と、該ベース部の該非粘着性表面領域と関連する粘着性部分とを有する。図１を見て分かるように、該ベース部の非粘着性露出表面領域２５０は、少なくとも該粘着性部分の粘着性露出表面領域３５０と同じ大きさである。

【０１３４】

上記フロアマットのベース部は、人の靴が該ベース部及び該粘着性部分に圧力を加えたときに、該ベース部及び粘着性部分が共に該人の靴の底面の形状に適合するような緩衝部材を有してもよい。また該粘着性部分は、該粘着性部分の底面に粘着性表面を有してもよい。

【０１３５】

種々の実施形態において、上記ベース部は、図１を見て分かるように、該粘着性部分の範囲を限定してもよく、あるいは、図１４を見て分かるように、該粘着性部分に隣接して配置してもよい。

【０１３６】

また少なくとも図１を見て分かるように、上記フロアマットは、人の靴底をその上に接触させるための連続する非粘着性露出表面領域２５０を有するベース部と、該靴底をその上

に接触させるための粘着性露出表面領域３５０を有する粘着性部分とを有する。また図１５、１６を見て分かるように、該ベース部の非粘着性露出表面領域及び該粘着性部分の粘着性露出表面領域は共に、大人用のサイズの靴の靴底全体がその上に収容可能であるようなサイズである。上記ベース部の連続する非粘着性露出表面領域２５０は、上記粘着性部分の粘着性露出表面領域の第１の側３５２に配設された第１の側の領域２５２と、上記粘着性部分の粘着性露出表面領域の反対の第２の側３５４に配設された第１の側の領域２５４とを有する。上記ベース部の連続する非粘着性露出表面領域の第１の側の領域は、該ベース部の連続する非粘着性露出表面領域の第２の側の領域よりも大きい。

【０１３７】

開示した実施形態の全ては、本発明が実施できる様々な方法で説明した。また、例えば、上記ベース部、上記粘着性部分、上記グラフィック表示部等の構成部材に対する開示した実施形態のうちのいずれか、およびそれらの構成部材に関連する全ての特徴は、本発明のいずれかの実施形態に組み合わせることができ、また本発明は、開示した特定の組合せの実施形態のみに限定されない。当業者は、本発明の主旨及び範囲を逸脱することなく、その他の実施形態を実施することが可能である。

【０１３８】

【図面の簡単な説明】

【図１】

本発明の一実施形態に係るフロアマットの斜視図である。

【図２】

図１のフロアマットの分解斜視図である。

【図３】

本発明のフロアマットの代替の一実施形態の拡大側面図である。

【図４】

本発明のフロアマットの代替の一実施形態の拡大側面図である。

【図５】

本発明のフロアマットのための、滑り止めの特徴を有する粘着性挿入部に対する第３の代替実施形態を示す図である。

【図６】

本発明のフロアマットのための、滑り止めの特徴を有する粘着性挿入部に対する第４の代替実施形態を示す図である。

【図７】

図６の滑り止めの特徴を有する粘着性挿入部に対する実施形態の側面図である。

【図８】

本発明のフロアマットのための、滑り止めの特徴を有する粘着性挿入部に対する第５の実施形態の斜視図である。

【図９】

本発明のフロアマットのための、滑り止めの特徴を有する粘着性挿入部に対する第６の代替実施形態を示す図である。

【図１０】

ベース部に対する代替実施形態に関連する図９の滑り止めの特徴を有する粘着性挿入部を示す図である。

【図１１】

本発明のフロアマットのための、滑り止めの特徴及び水散逸能力を有する粘着性挿入部に対する第７の代替実施形態を示す図である。

【図１２】

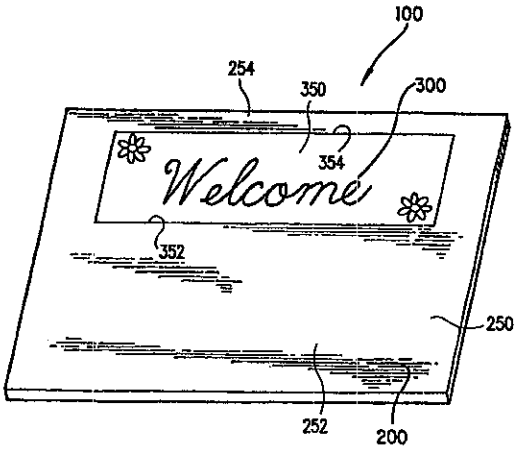
本発明のフロアマットのための水散逸能力を有する粘着性挿入部及びベース部に対する代替の一実施形態を示す図である。

【図１３】

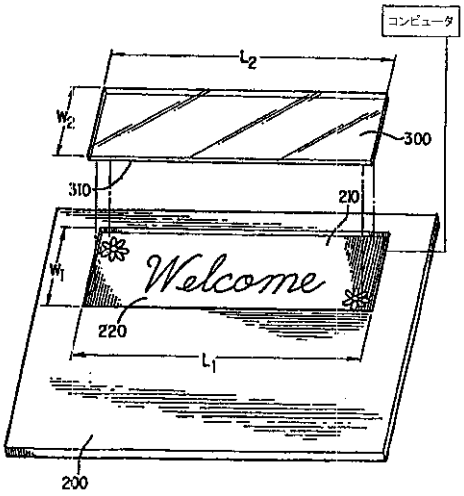
本発明の一実施形態で使用できるセンサシステムを示す図である。

【図１４】
粘着性部分及び非粘着性部分が分離可能なフロアマットに対する一実施形態を示す図である。
【図１５】
フロアマットを使用するプロセスの一工程において使用されているときの本発明のフロアマットの一実施形態の斜視図である。
【図１６】
フロアマットを使用するプロセスの第２工程において使用されているときの図１５のフロアマットの斜視図である。
【図１７】
交換可能なベース部を有する、本発明に係るフロアマットに対する代替実施形態を示す図である。
【図１８】
清浄可能な部分のための単一のシートを有する、本発明に係るフロアマットに対する代替実施形態を示す図である。
【図１９】
図１８の実施形態と共に使用できるシートのロールを示す図である。
【図２０】
図１９のシートのロールに対して使用できる保管コンテナを示す図である。
【図２１】
軌道上を移動可能なスクレーパーを有する、本発明に係るフロアマットに対する代替の一実施形態を示す図である。
【図２２】
軌道上を移動可能なスクレーパーを有する、本発明に係るフロアマットに対する代替の一実施形態を示す図である。
【図２３】
本発明の原理に係る粘着性の表面に対する代替の一実施形態を示す図である。
【図２４】
図２３の粘着性の表面に対する代替の一実施形態を示す図である。
【図２５】
本発明の原理に係る粘着性の表面に対する別の代替実施形態を示す図である。
【図２６】
本発明の原理に係る粘着性の表面に対する他の代替実施形態を示す図である。
【図２７】
本発明の原理に係る粘着性の表面に対する他の代替実施形態を示す図である。
【符号の説明】
１００，４００・・・フロアマット、２００・・・ベース部、２００Ａ・・・表面、２００Ｂ，３００Ａ・・・隆起部、２１０・・・凹部、２２０・・・グラフィック、２３０・・・水散逸部材、２４０・・・緩衝部材、３００・・・清浄可能部、３０１～３０５・・・層、３１０・・・底部側、３２０・・・格子パターン、３３０・・・挿入部の上面、３４０・・・最上面、３４２・・・開口部、３４４・・・トレッド、４１０・・・芯層、４２０・・・吸水層、５００・・・吸水縁部。

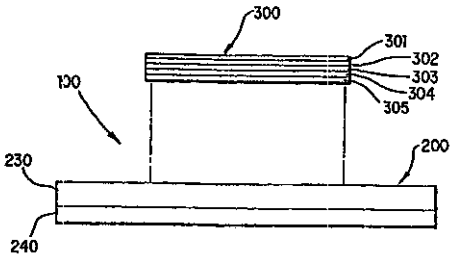
【図１】



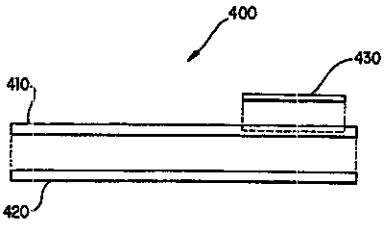
【図２】



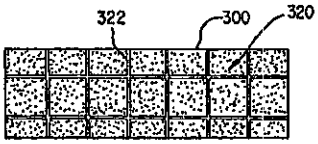
【図３】



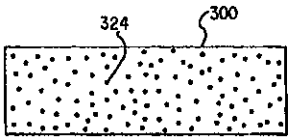
【図４】



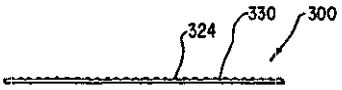
【図５】



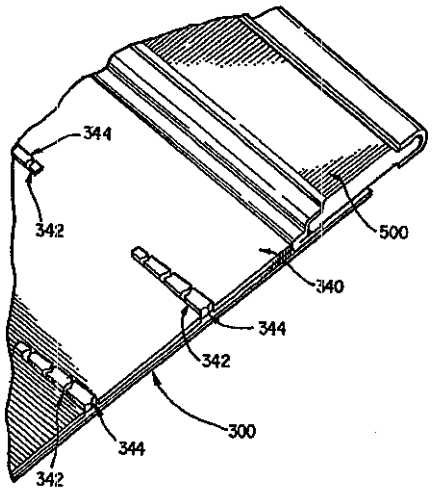
【図６】



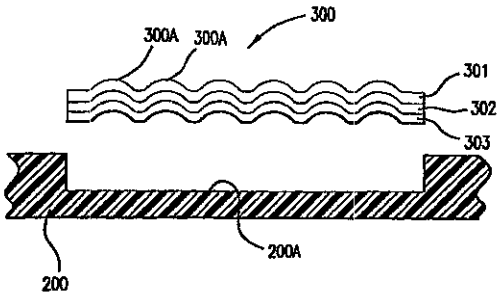
【図７】



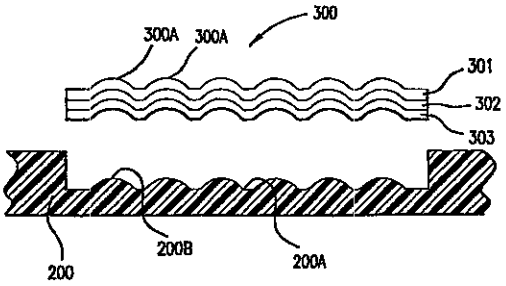
【図８】



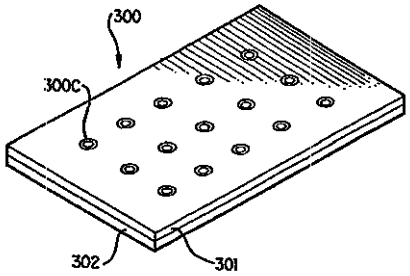
【図９】



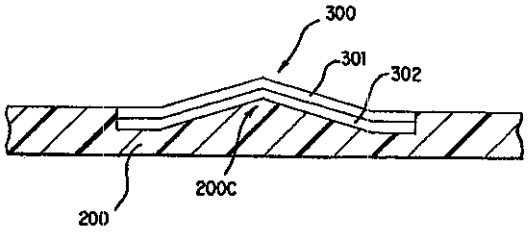
【図１０】



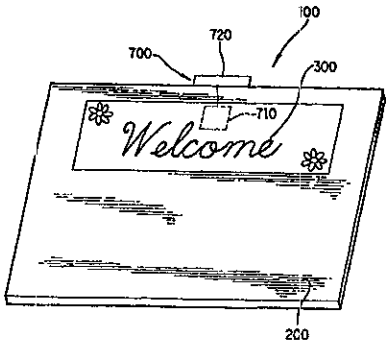
【図１１】



【図１２】



【図１３】



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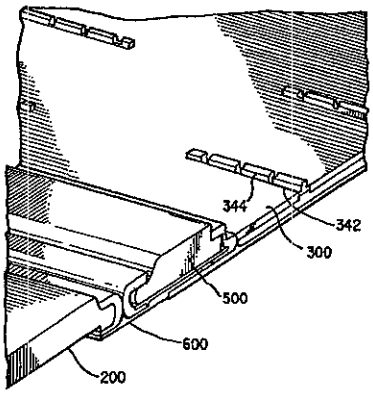

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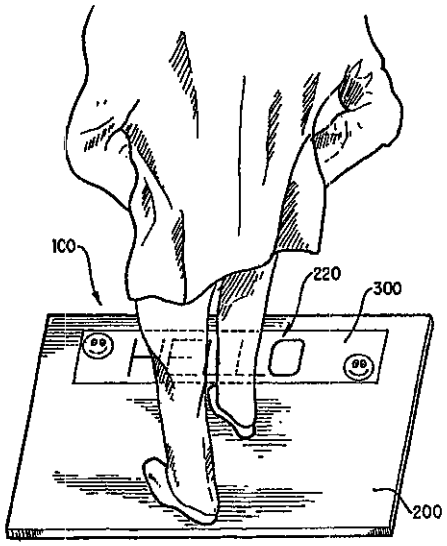

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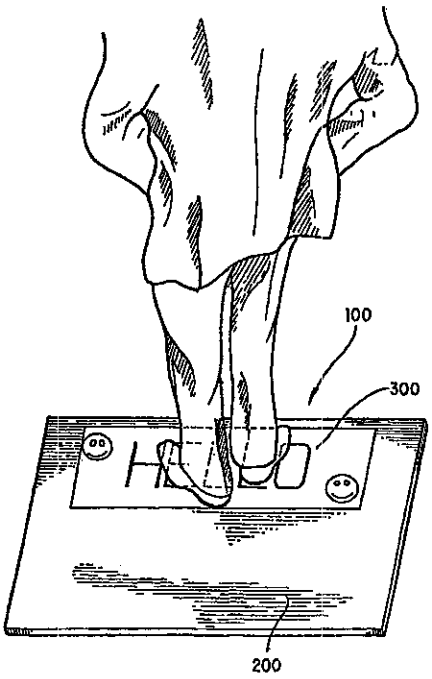

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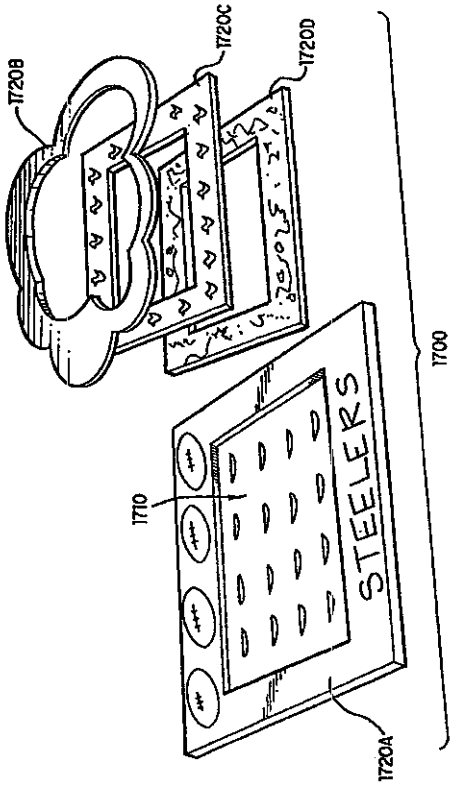

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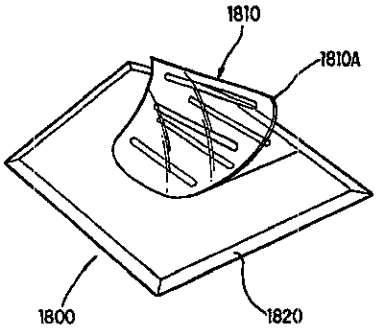

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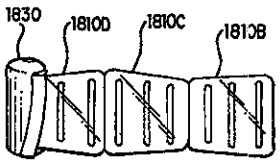

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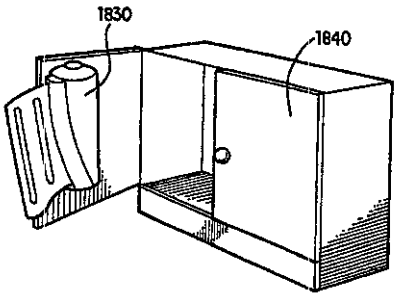

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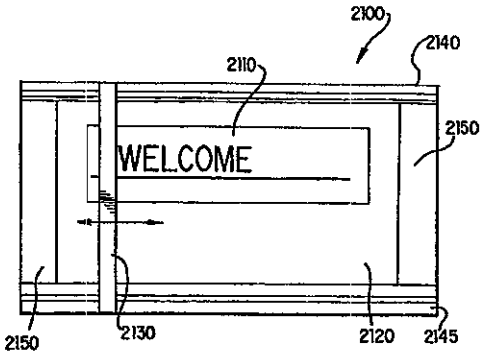

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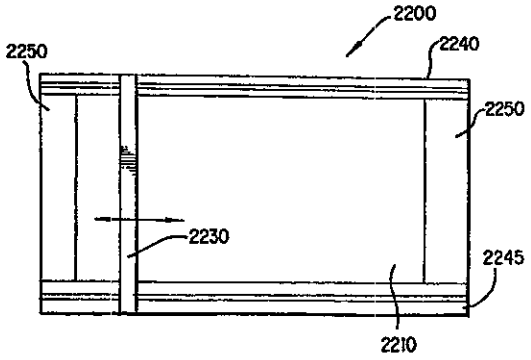

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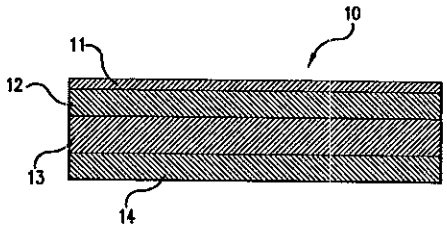

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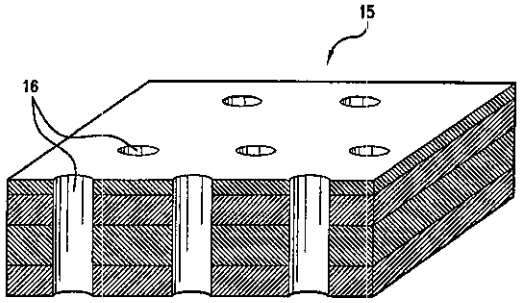

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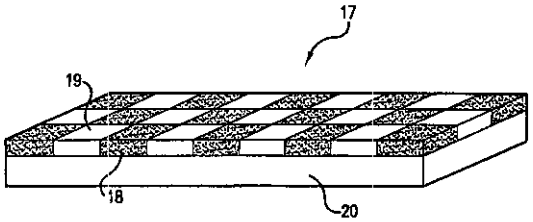

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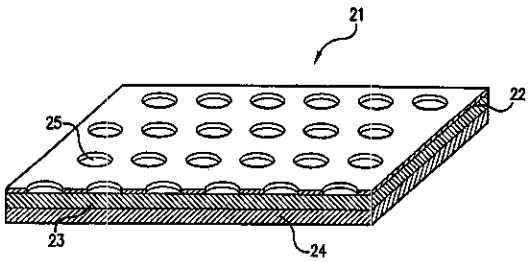

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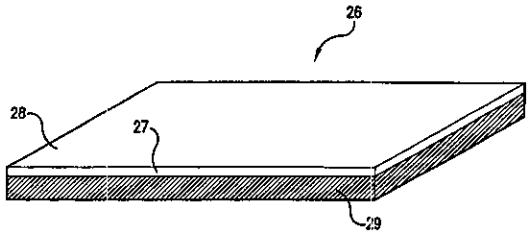

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(54) Title: FLOOR MAT INCLUDING TACKY SURFACE WITH TACKY-WHEN-DRY AND TACKY-WHEN-WET PROPERTIES

(57) Abstract: An advanced floor mat (100) is disclosed. In an embodiment of the present invention, the floor mat includes a cleanable portion (300). The floor mat may also include a water dissipation component (230), a water absorbing component (420), a cushioning component (240), customized graphics (800), a transparent cleanable portion, a tacky surface (301, 302, 303) on the cleanable portion, an antibacterial composition (100), an antifungal composition (100), and a fragrance (100). The cleanable portion may be erodible and may include a plurality of cleanable reusable layers. If a tacky surface is included in the floor mat, an anti-slip feature may be associated with the tacky surface to help prevent slipping on a possibly wet tacky surface. The tacky surface may comprise a material with a dual chemistry such that the tacky surface is tacky both when dry and when wet. Additionally, a sensor (700) system may be included in the floor mat to assist a user in identifying when the floor mat may require cleaning.

FLOOR MAT INCLUDING TACKY SURFACE WITH TACKY-WHEN-DRY AND TACKY-WHEN-WET PROPERTIES

This application claims the benefit under 35 USC section 119(e) of U.S. provisional application 60/246,602, filed November 8, 2000. Further, this application is a continuation-in-part of U.S. application no. 09/553,234, filed April 19, 2000 and issued May 22, 2001 as U.S. patent no. 6,233,776. Application no. 09/553,234 is a continuation-in-part of U.S. application no. 09/418,752, filed October 15, 1999, which is a continuation-in-part of U.S. application no. 09/304,051, filed May 4, 1999 and issued April 24, 2001 as U.S. patent no. 6,219,876.

Background and Discussion of the Invention

The present invention relates to a floor mat. More specifically, the invention provides a floor mat that includes a cleanable portion. The floor mat may also include a water dissipation component, a water absorbing component, a cushioning component, customized graphics, a transparent cleanable portion, a tacky surface on the cleanable portion, an antibacterial composition, an antifungal composition, and a fragrance. The cleanable portion may be erodible and may include a plurality of cleanable reusable layers. If a tacky surface is included in the floor mat, an anti-slip feature may be associated with the tacky surface to help prevent slipping on a possibly wet tacky surface. Additionally, a sensor system may be included in the floor mat to assist a user in identifying when the floor mat may require cleaning.

Floor mats are known for cleaning the soles of a person's shoes who is about to enter a particular area or room. One problem with floor mats in general is how to keep the floor mat sufficiently clean such that it may perform its function of cleaning the person's shoes when, by its very nature, it is purposefully dirtied when performing its function.

Known floor mats may be comprised of a single, unitary piece of material. Whereas these single structure floor mats may be kept clean by, for example, washing the floor mat, it may be required that the entire floor mat be removed from its location for washing and thus, the floor mat is not available where desired while the entire mat is being cleaned. Alternatively, even if the mat can be cleaned in-place, which may not be a possibility if it is located in, for example, a carpeted area, it may be inconvenient to clean the mat in-place.

U.S. Patent Number 3,785,102 to Amos discloses a throw-away pad comprising a plurality of stacked disposable sheets where, when a particular sheet is dirtied, the dirty sheet is removed and disposed of. The next sheet that is exposed after the dirty sheet is discarded is clean and thus, a clean surface is again available. However, there may be problems with comprising the floor mat of disposable sheets. Disposing of each dirty sheet may be uneconomical since each sheet is discarded after it becomes dirty. Additionally, after some finite number of sheets are disposed of, no sheets will remain and thus no effective cleaning surface is available.

U.S. Patent Number 3,785,102 to Amos also discloses that an adhesive can be provided on each sheet's top surface to improve its ability to remove dirt from a person's shoes. However, again, these sheets are not cleanable and therefore are not reusable.

U.S. Patent Number 3,717,897 to Amos et al. discloses a pad for cleaning shoes and wheels. The pad includes a thin water-washable adhesive covering its upper surface for removing dirt from shoes and wheels. Whereas the '897 patent discloses a pad with a water-washable adhesive upper surface, the pad is not known for use in domestic or office-type applications. As stated in the '897 patent, the pad is placed at an entrance doorway leading into a clean room.

Tacky floor mats are by far more popular for utilization in indoor environments that are far removed from exterior outside entrances, such as for clean rooms that are well-within the interior of the building in which they are used, e.g., hospital rooms, computer chip manufacturing spaces, and gymnasiums. Thus, tacky floor mats are not known for use in areas that are adjacent to entrances that lead from the outdoor environment for cleaning the soles of a person's shoes prior to entry into the interior of a building, such as for example in an entry foyer or on an outdoor porch.

Tacky floor mats are not known for use in domestic or office-type applications, e.g., home or business office use, because of several known deficiencies. One of these deficiencies is that their tacky surface will not be as effective if it becomes wet. Therefore, if the tacky surface floor mat was utilized in an outdoor environment, such as the outdoor porch mentioned above, or in an indoor environment that is adjacent to or near an outdoor entrance, such as an entry foyer of a home or business, for cleaning a person's shoes prior to further entering the home or business, the mat is likely to become wet and therefore not effective. The mat could become wet from, for example, the moisture in the atmosphere or from moisture carried on the soles of the person's shoes who steps on the mat. Additionally, if the tacky surface becomes wet it may become slippery and thus cause a hazard for the person who steps on it.

More particularly, over the past several decades, the adhesives that are typically used in tacky surfaces of floor mats have evolved to the point that they have been optimized through commercialization to a certain threshold of tackiness. Nevertheless, even at this optimal threshold, the tacky surface has the deficiency described above, wherein the tacky surface may become slippery when wet.

Efforts to address this problem by tinkering with the chemistry of the adhesives used in the tacky surface have been unavailing. Beyond the optimal threshold of tackiness as described above (that is, if the tacky surface is made tackier), a trip hazard is presented when the surface is dry. On the other hand, below the threshold (that is, if the tacky surface is made less tacky), a slip

hazard is presented when the tacky surface is wet.

In consideration of the foregoing, a single chemistry for an adhesive that provides a tacky surface that is tacky both when wet and when dry is not known. Accordingly, there is a need for a floor mat with a tacky surface that can be utilized in both a wet environment and a dry environment.

Additional deficiencies with using known tacky floor mats for home or office-type applications as discussed above is their likelihood of becoming trip hazards and their lack of aesthetic appeal. In the '897 patent, because the pad is designed for use in clean room environments, it is adhesively adhered to the passageway floor in front of the entrance doorway. This may be satisfactory for retaining the mat in-place in clean room-type of applications, however, if it was attempted to use the '897 pad on a carpeted floor, the pad would not properly adhere to the carpet and thus a trip hazard would be present. This could result in significant liability issues. The '897 pad does not have sufficient mass for it to remain in-place without utilizing an adhesive. Regarding aesthetics, because tacky floor mats are known only for their functional characteristics, and thus for use only in "clean room"-type applications, they are not aesthetically pleasing. Therefore, for at least the above reasons, tacky floor mats are not known for use in home or office-type applications.

Additional drawbacks with known floor mats exist that are directed to issues of customization for a particular purchaser and a lack of additional cleaning properties. A floor mat may be the first object that a visitor to a particular home or business encounters. As such, the owner of the home or business may want to utilize the floor mat to graphically convey an initial greeting or message to the visitor. Whereas floor mats are known that may include a greeting on them, it is not currently known to allow for a particular purchaser to customize the displayed graphic so that the message is tailored to convey a particular message desired by the purchaser. For example, on Halloween the purchaser may want the floor mat to display a "Happy Halloween" message. In another situation, the purchaser may want to greet a particular visitor with a message such as "Hello, Joe". Currently, it is not known to provide a floor mat where an individual can customize the floor mat to

display a particular message that they want to convey and in certain circumstances even change the floor mat's message they want to convey.

An additional problem with known floor mats, as mentioned above, is that they are limited in their ability to clean the soles of a person's shoes. Whereas known floor mats may be capable of removing dirt particles from the shoe's soles, they are not able to disinfect the soles nor provide a scent to the soles to assist in masking any unpleasant odors that may be associated with the shoes.

An additional drawback with known floor mats, even if they are cleanable, is that they do not assist a user in determining when the floor mat may require cleaning. Generally, the owner or custodian of the floor mat does not continuously or regularly monitor the condition of the floor mat with respect to cleanliness. Therefore, the floor mat could require cleaning, and because the owner is not consciously monitoring the condition of the floor mat, there could be a significant period of time before the owner realizes that the floor mat requires cleaning. Therefore, it would be desirable to assist the owner/custodian of the floor mat in determining when the floor mat requires cleaning.

Therefore, it would be desirable to provide an advanced floor mat that could address deficiencies that exist with currently known floor mats. The advanced floor mat of the present invention overcomes deficiencies in the prior art and may include a base portion which incorporates a cleanable portion that is adapted to be removably received within the floor mat. The floor mat may also include features such as a water dissipation capability, a water absorbing capability, a cushioning capability, customized graphics, a transparent portion, a tacky surface on the cleanable portion, an antibacterial composition, an antifungal composition, and a fragrance. The cleanable portion may include the features of being erodible and containing a plurality of cleanable reusable layers. If a tacky surface is included in the floor mat, an anti-slip feature may be associated with the tacky surface to help prevent slipping on a possibly wet tacky surface. Additionally, a sensor system may be included in the floor mat to assist a user in identifying when the floor mat may require cleaning. Other

features will be apparent from the detailed description which follows.

Brief Description of the Drawings

The various features of the invention will best be appreciated by simultaneous reference to the description which follows and the accompanying drawings, in which:

Fig. 1 is a perspective view of a floor mat in accordance with an embodiment of the present invention;

Fig. 2 is an exploded perspective view of the floor mat of Fig. 1;

Fig. 3 is an exploded side view of an alternative embodiment of the floor mat of the present invention;

Fig. 4 is an exploded side view of an alternative embodiment of the floor mat of the present invention;

Fig. 5 illustrates a third alternative embodiment for a tacky insert portion with an anti-slip feature for the floor mat of the present invention;

Fig. 6 illustrates a fourth alternative embodiment for a tacky insert portion with an anti-slip feature for the floor mat of the present invention;

Fig. 7 is a side view of the embodiment for the tacky insert portion with an anti-slip feature of Fig. 6;

Fig. 8 is a perspective view of a fifth embodiment for a tacky insert portion with an anti-slip feature for the floor mat of the present invention;

Fig. 9 illustrates a sixth alternative embodiment for a tacky insert portion with an anti-slip feature for the floor mat of the present invention;

Fig. 10 illustrates the tacky insert portion with an anti-slip feature of Fig. 9 in conjunction with an alternative embodiment for the base portion;

Fig.11 illustrates a seventh alternative embodiment for a tacky insert portion with an anti-slip feature and a water dissipating capability for the floor mat of the present invention;

Fig. 12 illustrates an alternative embodiment for a tacky insert portion and base portion with a water dissipating capability for the floor mat of the present invention;

Fig. 13 illustrates a sensor system that may be utilized in an

embodiment of the present invention;

Fig. 14 is an embodiment for a floor mat where the tacky portion and the non-tacky portion are separable;

Fig. 15 is a perspective view of an embodiment of the floor mat of the present invention as being used in one step of a process for utilizing the floor mat;

Fig. 16 is a perspective view of the floor mat of Fig. 15 as being used in a second step of a process for utilizing the floor mat;

Fig. 17 illustrates an alternative embodiment for a floor mat in accordance with the present invention that includes interchangeable base portions;

Fig. 18 illustrates an alternative embodiment for a floor mat in accordance with the present invention that includes single sheets for the cleanable portion;

Fig. 19 illustrates a roll of sheets that may be utilized with the embodiment of Fig. 18;

Fig. 20 illustrates a storage container that may be utilized with the roll of sheets of Fig. 19;

Fig. 21 illustrates an alternative embodiment for a floor mat in accordance with the present invention that includes a scraper movable on tracks;

Fig. 22 illustrates an alternative embodiment for a floor mat in accordance with the present invention that includes a scraper movable on tracks;

Fig. 23 illustrates an alternative embodiment for a tacky surface in accordance with the principles of the present invention;

Fig. 24 illustrates an alternative embodiment for the tacky surface of Fig. 23;

Fig. 25 illustrates another alternative embodiment for a tacky surface in accordance with the principles of the present invention;

Fig. 26 illustrates another alternative embodiment for a tacky surface in accordance with the principles of the present invention; and

Fig. 27 illustrates another alternative embodiment for a tacky surface in accordance with the principles of the present invention.

Detailed Description

Figure 1 illustrates a first embodiment for a floor mat 100 in accordance with the principles of the present invention. As can be seen in Figure 1, floor mat 100 includes a base portion 200 and a cleanable insert portion 300. As will be further described later in this specification, in this embodiment, cleanable portion 300 is received within base portion 200 and is removable from base portion 200.

Figure 2 illustrates an exploded, perspective view of the floor mat of Figure 1. As can be seen in Figure 2, base portion 200 is formed as a generally flat, planar member and defines a recess 210 within the top surface of base portion 200. Base portion 200 provides sufficient weight and mass for supporting cleanable insert portion 300 and maintaining the floor mat's positioning on the surface on which it is placed. Base portion 200 may include, as will be discussed below, a water dissipation capability, a water absorption capability, and a cushioning capability and may be comprised of materials such as polyurethane, polyisoprene and other cross-linked elastomeric materials, such as nylon-6, molded or woven to form a porous structure. Recess 210 can be configured in any of a variety of geometric configurations, however, in the present embodiment, recess 210 is configured in a rectangular shape. Recess 210 has a length L_1 and a width W_1. The depth of recess 210 is such that it is able to receive within it cleanable insert portion 300 such that when cleanable insert portion 300 is received within recess 210, the top surface of cleanable insert portion 300 lies generally in the same plane as the top surface of base portion 200.

The top surface of base portion 200 may be colored with any color depending upon the desires of a particular purchaser, however, it is preferable that a color be utilized that will minimize the visibility of any dirt that is accumulated by base portion 200. For example, it may be desirable that darker colors be utilized for the top surface of base portion 200 rather than lighter

colors. However, again, any particular color may be utilized for base portion 200, and particularly the top surface of base portion 200, depending upon the particular desires of an individual. Additionally, the base portion 200 may be either translucent or opaque.

As can be seen in Figure 2, the surface of base portion 200 which defines the bottom of recess 210 may include graphics 220 on that surface. In the illustrated embodiment, the graphics include pictorial representations of flowers and a text message which spells out the word "WELCOME". The present invention is not limited to any particular graphic within recess 210 and the present invention may include any of a variety of different forms of graphics.

Graphics 220 may be modified, and thus customized, by an individual after the floor mat has been purchased by the owner. The owner may customize the mat at their home or office and, thus, a graphic that may be appropriate for a particular situation may be modified by the individual for display in another situation. For example, the graphic may display a message stating "Happy Halloween" for Halloween and may be modified to display "Happy Holidays" during the winter holiday season. Thus, as can be understood, the graphics are modifiable by a user and thus, may be customized for the particular desires of a particular user.

As stated above, the present invention is not limited to any particular form for graphics 220. The graphics 220 can be customized by a user to include any of a variety of different colors, pictures, messages, or other representations that the user may want to display. In addition, the visible intensity of a color(s) can be modified. For example, a color that glows at night could be included in graphics 220 for an occasion such as Halloween.

Any of a variety of different types of structures or methods may be practiced in the present invention for modifying graphics 220 of floor mat 100 and the present invention is not limited to any particular methodology or structure for modifying graphics 220. Additionally, all of the various embodiments contemplated for providing a modifiable graphic display in the floor mat of the present invention can be incorporated in either, or both, of the

base portion or the insert portion. For example, the graphics may consist of pre-formed messages or art forms which may be adhered to either the surface which defines the bottom of recess 210, such as by using an adhesive or fastener assembly, e.g., a hook and loop assembly, or to the underside of insert portion 300 such that, when insert portion 300 is placed within base portion 200, the graphics would be visible through a transparent insert portion.

Alternatively, a variety of different graphics may be stored within floor mat 100 such that a user is able to selectively uncover a particular graphic for display while the other available graphics remain covered within floor mat 100. This type of selectability is known in other mediums where selectivity between a variety of different graphics within a common display panel is desired. For example, advertising bulletin boards at sporting events are able to selectively display a first particular message during a first particular period of time and display a second message during a second period of time on the same bulletin board.

A third possible alternative is to provide a modifiable display on the floor mat. The display surface can be associated with either the base portion or the insert portion, e.g., on either the bottom surface of recess 210 or attached to the bottom of insert portion 300. A display could be included on the front of the floor mat, on the back of the mat such that it is viewable through a transparent portion of the mat, embedded in the mat, attached to the mat, or integrally formed in the mat. For example, the display could be comprised of a small, thin box of graphics that could attach to a tacky portion and/or a base portion or any other component part of the floor mat. However it is associated with the floor mat, a user may design and display their customized graphic and may subsequently modify that graphic such that it is replaced with another graphic. A display surface such as an erasable writing board could be utilized for this purpose.

It is also contemplated that a modifiable electronic display surface could be provided, such as, for example, a liquid crystal display. The display could be connected to a computer and a computer generated image could be displayed on the display. Thus, the image displayed on the display could be

modified by generating a different computer image and displaying that computer image on the display. The display could be associated with base portion 200, such as included within recess 210, or could be included on a bottom surface, facing upward, of insert portion 300. Alternatively, the display could be integrally formed with either of the base portion or the insert portion. The modifiable display could utilize a plurality of different graphics that can be displayed in any of a variety of manners on the display. For example, the graphics could be displayed in a generally fixed position on the display or could scroll across the display, with both exemplary methodologies displaying multiple graphics either individually or in combination.

Other alternatives for modifying the graphics 220 of floor mat 100 include using light emitting polymers to create, and thus change, graphics 220. The light emitting polymers can be either applied to, attached to, or woven into the floor mat. The light emitting polymers may be utilized on any portion of floor mat 100, for example, on either the base portion or the insert portion, or on any other portion of the different embodiments for the floor mat. Light emitting polymers are known and described in U.S. Patents 5,945,502, 5,869,350, and 5,571,626, which are incorporated herein by reference in their entirety.

Other options for a display are to use electronic ink or electric paper. Electric paper is available from Xerox and is described in U.S. Patents 5,723,204, 5,604,027, 4,126,854, and 4,143,103, which are incorporated herein by reference in their entirety. Electric paper employs thousands of tiny, electrically charged beads, called Gyricon, each about the width of a human hair, to create pixels. The two-tone beads are embedded inside a liquid-filled plastic sheeting that forms the surface of the paper. Each bead, half-black, half-white, gyrates in response to an electric field. Whether the beads are black- or white-side up determines the image. Because there's no need to refresh the image, and because the screen isn't backlit, electric paper uses only a fraction of the power used by conventional electronic displays. Electromagnetic styluses and printer-like devices can be used for getting images onto the paper.

Electronic ink is available from E Ink Corp., at 45 Spinelli Pl., Cambridge, MA 02138. Electronic ink uses a microencapsulated micromechanical display system. Tiny microcapsules are captured between two sheets of plastic to create pixels. Alternatively, the capsules may be sprayed on a surface. The result is a flexible display material. The tiny capsules are transparent and contain a mixture of dark ink and white paint chips. An electric charge is passed through the capsules. Depending on the electrostatic charge, the paint chips float at the top or rest on the bottom of each capsule. When the paint chips float at the top, the surface appears white. When they rest at the bottom, and thus under the ink, the surface appears black. Each of the two states is stable: black or white. A transparent electromagnetic grid laid over the sheet's surface controls the shape of the image. The display may be wirelessly connected to, for example, a computer and thus, the World Wide Web by utilizing, for example, a Motorola paging system. Text on all displays, if multiple displays are used, can be changed at once by a single editor, through a Web page.

Again, a display, which could utilize any of the methods discussed above for modifying the display, could be associated with any portion of the floor mat, such as base portion 200 within recess 210 or on a bottom surface, facing upward, of insert portion 300. Alternatively, the display could be integrally formed with either of the base portion or the insert portion. The display could be utilized in any of the embodiments disclosed herein for the floor mat of the present invention, including a floor mat that includes a tacky surface and a non-tacky floor mat embodiment.

In further describing base portion 200, as mentioned above, base portion 200 may also include both a water dissipation component and a cushioning component. The water dissipation component provides for transferring moisture from the soles of a person's shoes that is standing on floor mat 100 to reduce the degree of moisture transferred to cleanable insert portion 300 and the cushioning component provides for conforming the floor mat 100 to the shape of the person's soles such that a greater amount of the debris on the person's soles may be removed by floor mat 100. The present

invention is not limited to any particular structure or material for the water dissipation component and the cushioning component. For example, the water dissipation component may be comprised of any of a wide variety of known materials, such as polyamides, vinylics, and polyisoprene. It is desirable, but not required, that the water dissipation component dissipate or move the water and not retain the water. Thus, porous materials, and not hydrophilic materials, are desired. The cushioning component may be comprised of any of a variety of cushioning components to include, for example, foam rubber.

Figure 2 also further illustrates cleanable insert portion 300. As can be seen, cleanable insert portion 300 has a geometric shape which is complementary in size and form to the recess 210 that is formed within base portion 200. As such, cleanable insert portion 300 is able to be received securely within recess 210. Thus, cleanable insert portion 300 has a length L_2 which is just slightly smaller than the length L_1 of recess 210. Likewise, cleanable insert portion 300 has a width W_2 which is also just slightly smaller than width W_1 of recess 210.

On the bottom side 310 of cleanable insert portion 300, i.e., that surface which contacts the surface which defines the bottom of recess 210, an attachment mechanism may be provided such that cleanable insert portion 300 may be removably attached to base portion 200 within recess 210. Any of a variety of different attachment mechanisms may be provided on the bottom surface of cleanable insert portion 300 to include, for example, a hook and loop fastener assembly or an adhesive. Regardless of the particular securement mechanism used to removably attach cleanable insert portion 300 to base portion 200, in this embodiment, cleanable insert portion 300 may be removed from base portion 200 such that it may be cleaned by a user and, after cleaning, be reinserted within recess 210 such that a clean surface is now provided for floor mat 100.

As stated above, cleanable insert portion 300 may be formed from a transparent material such as hydrophilic aliphatic acrylic polymers and copolymers incorporating acrylic acid, hydroxy ethyl methacrylate, and glycerin monomethacrylate. Forming cleanable insert portion 300 of a transparent

material would allow an individual to view the customized graphics that may be provided within floor mat 100, as discussed previously. Alternatively, the insert portion 300 could be opaque.

Additionally, the top side of cleanable insert portion 300 may include a tacky surface. The tacky surface would provide for assisting in removing debris from the soles of a person's shoes that is standing on cleanable insert portion 300. When the top tacky surface of cleanable insert portion 300 is dirtied to such an extent that the user desires to clean insert portion 300, in this embodiment, the user removes insert portion 300 from base portion 200 and cleans insert portion 300 to remove the accumulated debris. The insert portion 300 is then reinserted into base portion 200.

The tacky surface that is provided on the top side of cleanable insert portion 300 could be comprised of any of a variety of materials, such as polyvinyl chlorides combined with a suitable plasticizer, plasticized neoprene, polysulfides, and polyurethanes. Additionally, acrylics, such as butyl acrylate and many of its homologues, may be utilized. Again, the present invention is not limited to any particular material. The tacky surface may be formed, generally, from any adhesive material. The only consideration, in this embodiment, is that the surface should maintain its tacky characteristic even after repeated cleaning cycles.

The present invention is not limited to any particular methodology for cleaning insert portion 300. Insert portion 300 may be cleaned by any of a variety of methods depending upon a particular material composition for insert portion 300. For example, insert portion 300 may be cleaned by placing insert portion within a washing machine and washing insert portion 300 or insert portion 300 may be cleaned by scrubbing insert portion 300 with a scrub brush and soap and water or with a cleaning agent such as "Spic 'N Span".

Additionally, the insert portion 300 could be cleaned by utilizing a roller that also includes a tacky surface around the circumference of the roller. The tacky surface of the roller is comprised of a stronger adhesive than that of the tacky insert portion such that, as the tacky surface of the roller is rolled over the tacky surface of the insert portion, any dirt and debris on the tacky insert

portion will be drawn off of the tacky insert portion and will adhere to the roller. In this manner, a roller with a tacky surface could be utilized to clean the tacky insert portion.

Again, however, the present invention is not limited to any particular methodology or cleaning agent for cleaning insert portion 300 and any cleaning methodology or agent compatible with the composition of insert portion 300 is contemplated.

Floor mat 100 may also include additional features for assisting in the cleaning of the soles of a person standing on floor mat 100. For example, base portion 200 and/or insert portion 300 may include an antibacterial composition and an antifungal composition. Antibacterial compositions such as anthraquinone derivatives of polyethylene glycol mono- and di-methacrylate could be utilized. Thus, floor mat 100 would be bacteriacidal. The antibacterial feature would be particularly desirable because the floor mat would be able to both clean structural debris from the soles of the person's shoes and remove any potentially harmful bacteria from the person's soles as well.

Additionally, in order to further provide for a desirable sole surface prior to entering a particular area, floor mat 100 could also be provided with a fragrance. Flavones such as tricyclic molecules with aromatic substitution or organic ethers, e.g., limonoic acid, could be utilized. The fragrance is transferred from floor mat 100 to the soles of the person's shoes such that any undesirable odors are favorably masked by the fragrance.

The present invention is not only limited to utilizing an antibacterial composition, an antifungal composition, and/or a fragrance in floor mat 100. Rather, floor mat 100 could also incorporate a variety of other substances that would assist in cleaning the soles of a person's shoes.

Any variety of structures or methods could be utilized for associating an antibacterial composition, an antifungal composition, a fragrance, or any other composition, with floor mat 100. The substances could be applied as releasable, or dissipatable, coatings to floor mat 100 or could be releasably embedded as, for example, pellets within the structure of floor mat 100 such that as pressure is applied to floor mat 100 the substances are dispensed to

the soles of the person's shoes.

Figure 3 illustrates an alternative embodiment for floor mat 100. In Figure 3, it is illustrated that base portion 200 may include separate layers for a water dissipation component 230 and a cushioning component 240. Water dissipation component 230, in this embodiment, is disposed on a top side of the cushioning component 240. However, the present invention is not limited to this particular embodiment for water dissipation component 230 and cushioning component 240. For example, a single hybrid structure could be utilized for base portion 200 that would include the material properties to provide for both water dissipation and conforming structure.

Alternatively, Figure 4 illustrates that the floor mat may include both a water dissipation component, or wicking layer, and a water absorbtion layer. In Figure 4, floor mat 400 includes wicking layer 410 and water absorption layer 420. The wicking layer 410 could be comprised of polypropylene or olefins, or any other suitable material that has the properties of moving the water from the surface of floor mat 400. The water absorption layer 420 is disposed underneath the wicking layer 410 and absorbs any water that passes through the wicking layer 410. The water absorption layer 420 could be periodically removed and dried, such as by example only, in a drying machine. Of course, a wicking layer 410 may be used either with or without a water absorption layer 420 and a cushioning layer, as described previously in other embodiments, and the water absorption layer 420 could be used with or without a wicking layer 410 and a cushioning layer. Additionally, both the wicking layer and/or the absorption layer and/or the cushioning layer could be used with or without a tacky portion.

Returning to Figure 3, Figure 3 also illustrates an alternative embodiment for insert portion 300. Whereas the previously disclosed embodiment for insert portion 300 was discussed as a single structural member that could include a tacky surface on a top side thereof, the embodiment of Figure 3 for insert portion 300 is comprised of a plurality of layers. As can be seen, layers 301-305, comprise insert portion 300. Each of the layers may include a tacky surface on a top side thereof, as was described previously for

insert portion 300. In use, a top-most layer, e.g., layer 301, may be removed from its adjacent lower layer, e.g., layer 302, and may be independently cleaned. After cleaning, the layer may be reinstalled within recess 210 on top of the exposed layer of insert portion 300. In this manner, insert portion 300 may be cleaned by removing a top-most layer, cleaning that layer, and reinstalling that layer within recess 210. Whereas each layer is described as being independently cleanable, it is not required that each individual layer be cleanable. Each layer may be formed of materials as described previously when discussing the embodiment of Figures 1 and 2 for the insert portion.

Other alternative embodiments for insert portion 300 are contemplated. For example, whereas the previously disclosed embodiments discussed insert portion 300 as being comprised of one or more layers with a tacky surface on a top side of the layer(s), it is not required that insert portion 300 be formed with only a tacky surface on a top side thereof. More specifically, an alternative embodiment for insert portion 300 could include forming insert portion 300 as a single structural member from a material which is tacky in composition throughout the entire cross-section of the material. A material such as a blend of a noncross-linked hydrophilic thermoplastic, preferably a polyethylene glycol diacrylate with n not exceeding 15, and a hydrophobic material, such as a polyvinyl neoprene chloride, could be utilized for the insert portion of this embodiment. By forming insert portion 300 from a uniform, tacky material, the insert portion 300 does not necessarily have to be removed from recess 210 of base portion 200 to be cleaned. Insert portion 300 could be cleaned in this alternative embodiment by eroding the top surface of the insert portion as a result of use of the insert portion. Thus, by providing an erodible insert portion, the insert portion may be cleaned by the erosion of its top surface as the insert portion is used within floor mat 100.

As insert portion 300 erodes, the exposed surface of insert portion 300 continues to be tacky in composition because of its uniform cross-section. As the exposed tacky surface erodes, the dirt captured by the exposed tacky surface will dissipate as a result of the erosion and thus, the erosion of the insert portion itself provides for a cleanable insert portion.

Alternatively, even with a uniform cross-section of a tacky substance for insert portion 300, the user may remove insert portion 300 from recess 210 and separately clean insert portion 300. Thus, the user is not required to rely solely on the erodible characteristic of insert portion 300 for cleaning of insert portion 300; rather, the user may utilize the erodible cleaning feature of the insert portion in combination with a separate cleaning step of removing the insert portion from the base portion and independently cleaning the insert portion.

As discussed above, insert portion 300 may be comprised of a variety of materials, including materials such as tacky plastics, paper, or adhesives that can be cleanable and may or may not be erodible and reusable. If paper is utilized, the insert portion may be formed as a single structural member or as a plurality of layers, as discussed previously. Additionally, the paper may include a tacky surface on a top-side thereof. The paper may be translucent, opaque, or colored, and may include a graphic display thereon.

As discussed earlier, it is desirable, but not required, that the floor mat contain a water dissipation and/or absorption capability. This capability is desired to help prevent the tacky surface of the insert portion from becoming excessively wet and, thus, slippery. Whereas it has been discussed that, in order to help prevent a user from slipping on the tacky surface of the insert portion, a water dissipation and/or absorbing capability could be included in the floor mat to reduce the degree of moisture on the tacky surface, this is not the only structure contemplated for preventing the tacky insert portion from becoming slippery. Alternatively, the tacky insert portion itself could be formed to help prevent slipping. Figures 5-12 and 23-27 illustrate alternative embodiments for tacky insert portion 300. Figure 5 illustrates tacky insert portion 300 as including a grid pattern 320 of channels 322 that could be comprised of a non-tacky material. The channels could be either raised from the surface of insert portion 300 or could lie co-planar with the top surface of the insert portion. By forming the channels of a non-tacky material, even if the tacky material of insert portion 300 became wet, a user would be assisted in not slipping on the slippery, wet tacky surface of the insert portion by the

presence of the non-tacky surfaces which do not become slippery when wet.

Figures 6 and 7 illustrate another alternative embodiment for tacky insert portion 300 which includes anti-slip particles 324, e.g., silicon or sand particles, which extend above the top surface 330 of the tacky insert portion. It is desirable that the anti-slip particles be comprised of a material that does not become slippery when wet and that they be exposed from the tacky surface, however, it is not required. Even if the anti-slip particles are embedded within the tacky surface, their extension above the top surface 330 of the tacky insert portion will provide a physical frictional restraint against slipping for the soles of a person's shoes who is standing on the floor mat.

Whereas Figure 5 illustrates tacky insert portion 300 as including a grid pattern 320 of channels 322 that could be comprised of a non-tacky material and Figures 6 and 7 illustrate another alternative embodiment for tacky insert portion 300 which includes anti-slip particles 324 which extend above the top surface 330 of the tacky insert portion, it is not required that these two alternative embodiments contain features that are mutually exclusive. For example, it is contemplated that tacky insert portion 300 could include both a grid pattern of non-tacky channels and anti-slip particles, which is not illustrated specifically in the Figures but which can be easily understood.

Another alternative for providing a slip-resistant tacky portion is to include a plurality of anti-slip members, or treads or nipples, that extend up through and slightly above the surface of the tacky portion. As can be seen in Figure 8, in this embodiment, tacky portion 300 is inserted within a base portion, which may be a water absorbent border 500, and includes a plurality of apertures 342 within it. Each of a plurality of treads 344, which may extend upward from a base disposed underneath tacky portion 300, extend up through one of the plurality of apertures 342. A top-most end of each tread extends above a top-most surface 340 of tacky portion 300. As a person steps onto tacky portion 300, the quantity and positioning of the treads 344 is such that the tacky portion is able to remove debris from the person's shoes and the treads 344, at least one of which is stepped upon by the person, prevents slipping of the person on the tacky portion 300 should the tacky portion 300 become

slippery when wet. The treads 344 may compress when stepped upon such that the top-most end of the tread is co-planar with the top-most surface 340 of the tacky portion 300. In this manner, the tread will contact the person's shoes to prevent slipping but yet not hinder contact between the person's shoes and the tacky surface of the mat, which enhances the cleaning of the person's shoes. Therefore, there is a relationship between the distance that the tread extends above the top-most surface of the tacky portion and the compressibility of the tread; a relationship which provides the functionality discussed above.

The treads may be configured in any shape and size. Additionally, the treads may be comprised of any material which is slip-resistant when wet, such as, for example, rubber or plastics. The treads may include grooves within them to further assist in preventing a person from slipping on the tacky portion.

Figures 9 and 10 illustrate additional alternative embodiments for both the tacky insert portion 300 and the base portion 200 that help to prevent slipping on a potentially wet tacky portion. As can be seen in Figure 9, and as discussed previously, tacky insert portion 300 is comprised of a plurality of layers 301, 302, and 303. Whereas only three layers are illustrated, it can be understood that any number of layers can be utilized in the present invention. As can be seen, tacky layers 301-303 each contain a plurality of integrally formed raised portions 300A. These raised portions can help to prevent a person from slipping on the tacky portion by providing increased friction between the top surface of the tacky layer, due to the raised portions, and the person's shoes. Thus, these raised portions can substantially reduce the potential for slipping on the tacky portion if it becomes wet.

The raised portion 300A can be formed in each layer in a variety of ways and the present invention is not limited to any particular method. One method for forming the raised portions is to assemble the layers into a pad of layers and then insert the entire pad into a machine press. One face of the press is flat and the other face, i.e., that face that is facing the non-tacky, or underside, of the layers, contains an array of bosses or bumps. When the pad

is pressed in the machine press, all of the tacky layers become embossed with the pattern on the press face, causing the raised portions, or embossed portions, in each tacky layer of the pad. Thus, each embossed portion is integrally formed in each layer and is comprised of an indentation on the underside, or non-tacky side, of each layer and a raised portion on the upperside, or tacky side, of each layer.

As can be understood, in the method as described above for forming the raised portions, the raised portions of each layer are aligned with the raised portions of each other layer. It is desirable, but not required, that the raised portions of each layer are aligned so that their shape may be easily maintained when the layers are stacked one upon another.

As can be seen in Figure 10, base portion 200 may also be formed to be complementary to the embossed layers. The surface 200A that defines a bottom of the recess of base portion 200, which receives within it the tacky layers 300, can be formed with raised portions 200B. These raised portions are positioned so that they are aligned with the raised portions in the tacky layers. Thus, the raised portions 200B on surface 200A are positioned within the indentations in the lower-most tacky layer when the layers are inserted into the recess in the base portion. As can be understood, these raised portions help to retain and maintain the raised portions in the tacky layer(s), particularly when only the lower-most layer(s) remain in the floor mat. However, it is not required that the base portion be formed with raised portions in practicing the present invention. The layers may be formed with raised portions whether or not the base portion includes complementary raised portions.

In another alternative embodiment for a tacky portion, the tacky portion could also include a water dissipating capability. The tacky portion could be comprised of a hydrophobic porous structure which would assist in dissipating water from the surface of the tacky portion.

Figures 11 and 12 illustrate alternative embodiments for the floor mat of the present invention that provide a water dissipating capability for the tacky portion. As will be discussed, the embodiment of Figure 11 also helps to prevent a person from slipping on a potentially wet tacky portion.

Figure 11 illustrates an embodiment for tacky portion 300 where the tacky layers 301 and 302 of the tacky portion define a plurality of apertures 300C therein. The apertures of each layer are aligned with the apertures of each other layer. Thus, because of the aligned apertures in the layers, the tacky portion is able to drain surface water from the top-most surface of the tacky portion, or from the soles of a person's shoes that is standing on the tacky portion, through the apertures and to the base portion, within which the layers may be positioned. The base portion, as discussed previously, may include a water dissipation component and/or a water absorbing component which would move and/or absorb the surface water drained from the tacky portion through the apertures.

The apertures would also provide for helping to prevent slipping on a wet surface of the layers, not only by draining surface water from the surface, but by also providing for enhanced frictional contact between the shoes of the person stepping on the layer and the layer itself. The apertures provide for discontinuities in the surface of the layer which would enhance the frictional contact between the person's shoes and the layer. The edges of the surface of the layer which define the apertures would provide for this enhanced contact. The person's shoes would engage with the edges, thus enhancing frictional contact for the shoes. Additionally, the apertures would act as a suction on the bottoms of the person's shoes, e.g., like suction cups. This suction caused by the apertures on the person's shoes would also help to prevent slippage on the surface of the layer.

Figure 12 illustrates another embodiment for the floor mat of the present invention that also provides a water dissipating capability for the tacky portion. As can be seen, tacky portion 300 includes layers 301 and 302. Base portion 200 defines a recess where layers 301 and 302 are disposed within the recess. A surface of the base portion that defines a bottom of the recess includes a raised portion 200C at or near a center position within the recess. Thus, the raised portion 200C of the base portion forms a raised portion in each of the layers. As can be understood, the raised portion formed in the layers acts to dissipate surface water on the layers from the layers. The

surface water will drain off of the layers under the force of gravity due to the raised portion.

Again, any number of layers may be included in tacky portion 300 in the embodiments of Figures 11 and 12.

It is also contemplated that a water absorbing powder, such as a talcum powder, could be provided in the present invention. The powder could either be integrated into the floor mat or be separately associated with the floor mat. The talcum powder would remove moisture from the soles of a person's shoes when the person stepped into the powder and the tacky insert portion could then remove the powder from the person's soles, in addition to any dirt on the soles, when the person next steps on the tacky insert portion.

The present invention also provides an apparatus and method for determining when the tacky portion, or a layer in the tacky portion, should be removed for cleaning. Since the tacky portion assists in removing dirt from the soles of the person's shoes that steps on the tacky portion, the tacky portion, or a layer thereof, will become dirty after some number of persons step on the it, assuming that any particular person's shoes are not exceptionally dirty. Therefore, it would be desirable to assist a person in deciding when to remove a dirty tacky portion for cleaning. Again, as discussed above, this determination can be made after a certain number of persons step on the mat. Thus, an embodiment of the present invention as illustrated in Figure 13 includes a sensor system 700 that detects the presence of a person on the floor mat 100. The sensor system 700 may detect the presence of a person on base portion 200 and/or tacky portion 300. Since it is assumed that a person who steps on base portion 200 will also step on tacky portion 300, sensing the person's presence on either portion is sufficient for practicing the present invention.

Sensor system 700 includes a sensor 710 and a display device 720, e.g., an LED, coupled to sensor 710 and disposed on mat 100 such that it can be viewed. A power source, such as a battery, may be included on an underside of the floor mat. As mentioned above, sensor 710 senses the presence of a person on mat 100, e.g., in this embodiment on tacky portion

300. The sensor can detect the person's presence by utilizing any of a variety of apparatuses and methods and can include sensing the pressure applied to the mat by the weight of the person standing on the mat or by sensing the motion across the surface of the mat by the movements of the person. Thus, pressure sensors and motion detectors may be utilized in the present invention. Sensor system 700 also determines the number of persons that have stepped on the mat 100 by counting the number of sensed presences. After the number of presences equals a defined number of presences, a signal is provided to display device 720, e.g., illuminating the LED, which indicates that the tacky portion should be removed for cleaning. The present invention is not limited to removing the tacky portion at any particular number of sensed presences and the number may be adjusted based on the particular environmental conditions in which the mat is utilized. Of course, as can be understood, after the dirty tacky portion or layer is removed and/or cleaned the sensor system can be reset to begin counting the total number of presences on the newly cleaned or exposed layer.

Alarm device 720 can provide either a visual, audible, or vibratory signal and the present invention is not limited to providing any particular type of signal. For example, a visual signal could consist of a light that is illuminated when the floor mat should be cleaned and that is not illuminated when the floor mat does not require cleaning. Alternatively, the light could be continuously illuminated in one of a plurality of different colors, with each color signifying a different state of cleanliness for the floor mat. For example, a green light could signify that the mat does not need cleaning. A yellow light could indicate the mat is reaching a state of dirtiness that will soon require cleaning. A red light, which could blink on and off, could signify that it is time to clean the floor mat.

The sensor system of the present invention may be utilized with any of the embodiments disclosed for the cleanable portion, which may or may not be an insert and may or may not include layers and a tacky surface(s), and the base portion.

Whereas cleanable portion 300 has been discussed as an insert portion, it is not required that cleanable portion 300 be inserted into floor mat

100. There exists many alternative possibilities for associating cleanable portion 300 with floor mat 100. For example, cleanable portion 300 could be placed on top of base portion 200 or could be positioned adjacent to base portion 200. The present invention is not limited to inserting any of the embodiments for cleanable portion 300 within base portion 200.

For example, Figure 14 illustrates a tacky portion 300 and a non-tacky portion 200, which may include a water dissipation component, a water absorbing component, and a cushioning component, as discussed previously, that are separable. As can be seen in Figure 14, tacky portion 300 may be bordered within a border 500, which may be water absorbent, water dissipative, and include a cushioning component, and may include a plurality of apertures 342 and treads 344 within it. Tacky portion 300 can include any of the embodiments previously discussed. An attachment layer 600 is positioned on an underside of both border 500 of tacky portion 300 and non-tacky portion 200. The border 500 and/or non-tacky portion 200 may be releasably attached to attachment layer 600. Thus, through attachment layer 600, border 500, and therefore tacky portion 300, and non-tacky portion 200 are releasably attachable to each other. In this manner, it is possible to, for example, position non-tacky portion 200 outside of a person's home on the front porch and tacky portion 300 within the person's home.

Attachment layer 600 can be any of a variety of materials. All that is required is that the attachment layer be able to releasable join one portion of the floor mat to a second portion of the floor mat. For example, a hook and loop fastener assembly, e.g., Velcro®, can be used with one portion of the assembly on the attachment layer and the other portion on the underside of the first portion of the floor mat and the second portion of the floor mat. Alternatively, an adhesive can be utilized to releasably join the two portions of the floor mat to the attachment layer. Additionally, snaps, including any type of male/female connector, may be used to join the two portions to the attachment layer.

Figure 15 illustrates a first process step in utilizing an embodiment of the floor mat 100 of the present invention. As was described previously, an

embodiment of floor mat 100 includes a base portion 200 and an insert portion 300. As can be seen in Figure 15, and as was also discussed previously, a different graphic display 220 is present in the embodiment of Figure 15 than was illustrated in the embodiment of Figures 1 and 2. Thus, Figure 15 displays a "Hello" message with "smiley face" representations in the graphic 220.

As can be seen in Figure 15, in utilizing an embodiment of the present invention, a user would first step upon base portion 200. As discussed earlier, base portion 200 may include a water dissipating and/or absorbing component and is thus able to assist in removing any moisture from the soles of the person's shoes. As was also discussed earlier, because base portion 200, in one embodiment, also includes a cushioning component, base portion 200 conforms to the person's soles when the person steps upon base portion 200. Whereas not illustrated in Figure 15, as discussed previously, an antibacterial composition, an antifungal composition, a fragrance, or any other cleaning substance may also be associated with floor mat 100 and applied to the soles of the person's shoes when the person applies pressure to floor mat 100.

As can be seen in Figure 16, the second process step in utilizing the present invention includes the person stepping onto insert portion 300 of floor mat 100. As discussed previously, insert portion 300 may include a tacky surface on a top side thereof for assisting in removing debris from the soles of the person's shoes. Additionally, antibacterial compositions, antifungal compositions, fragrances, or other cleaning compositions may also be included within insert portion 300 for dispensing to the soles of the person's shoes.

After the person steps onto insert portion 300, the user then steps off of floor mat 100. As described previously, floor mat 100 may be cleaned after an accumulation of dirt on insert portion 300 by any of the methods described previously. Insert portion 300 may be removed from base portion 200 and cleaned, a layer may be removed from insert portion 300 to be cleaned or discarded, or insert portion 300 may be cleaned through erosion of insert portion 300. The present invention is not limited to any particular methodology for cleaning insert portion 300 of floor mat 100.

Figures 17-22 illustrate further alternative embodiments for the floor mat of the present invention. As can be seen in Figure 17, in this embodiment for the floor mat, floor mat 1700 includes a cleanable portion 1710 and a plurality of base portions 1720A-D. As can be seen, cleanable portion 1710 is positioned within one of base portions 1720A-D. In this manner, the floor mat 1700 can be customized for a particular user by interchanging the cleanable portion 1710 with one of a variety of base portions 1720A-D. The base portions 1720A-D can be formed in any of a variety of physical configurations and can include any of a variety of themes, graphics, or colors. Thus, a common cleanable portion 1710 may be utilized with a variety of base portions 1720A-D.

Figures 18-20 illustrate another alternative embodiment for a floor mat 1800 in accordance with the principles of the present invention. As can be seen in Figure 18, floor mat 1800 also includes a cleanable portion 1810 and a base portion 1820. As discussed previously, cleanable portion 1810 is received within base portion 1820. In this embodiment, cleanable portion 1810 is comprised of a single sheet 1810A. The single sheet 1810A may be tacky on a top-side thereof and may include apertures therein to receive anti-slip nipples though it, as was also discussed previously. The single sheet 1810A, in this embodiment, may be removed and replaced with another sheet when dirty.

Figure 19 illustrates that a plurality of sheets 1810B-D, may be attached to each other and rolled into a roll 1830 of sheets. The sheets can be joined to each other at a perforated joint to provide for ease in separating a sheet from the roll of sheets. As can be understood, a sheet may be separated from the roll of remaining sheets and may be then inserted into base portion 1820.

Figure 20 illustrates that the roll of sheets 1830 may be stored in a storage device 1840, such as, for example, by mounting the roll of sheets 1830 on a cabinet door, which may be located in proximity to the floor mat. In this manner, replacements sheets are easily organized and stored for use.

Alternatively, instead of organizing the sheets in a roll and storing the

roll in a cabinet, the sheets could be folder one upon another such that they form a flat package. The package of sheets could then be stored underneath of the floor mat 1800 where individual sheets could be removed from the package and from under the floor mat, when needed, similar to the way a Kleenex® tissue is dispensed.

Figure 21 illustrates another alternative embodiment for a floor mat in accordance with the present invention. Floor mat 2100 also includes a cleanable/scrapable portion 2110 and a base portion 2120. In this embodiment, cleanable portion 2110 is formed, as discussed previously in this application, as a single structural member from a material which is tacky in composition throughout the entire cross-section of the material. As was also discussed previously, by forming portion 2110 from a uniform, tacky material, the portion 2110 does not necessarily have to be removed from the base portion 2120 to be cleaned. However, in the embodiment previously discussed, the cleanable portion 2110 could be cleaned by eroding the top surface of the insert portion as a result of use of the insert portion. In the embodiment of Figure 21, the cleanable portion is cleaned by scraping off a top surface of approximately 2-3 microns from the cleanable portion 2110 by utilizing a scraper 2130.

Scraper 2130 can include any of a variety of structures, however, all that is required is that the scraper be capable of removing a top surface from cleanable portion 2110. For example, any type of scraping surface can be utilized in scraper 2130, such as, for example, a dull knife, a razor, or a plane.

Scraper 2130 is movable on tracks 2140, 2145. Tracks 2140, 2145 are adjacent to cleanable portion 2110 and base portion 2120. Scraper 2130 may include wheels or other structures, e.g., pins, which are received within complementary structures, e.g., grooves, in tracks 2140, 2145. Thus, scraper 2130 is movable across cleanable portion 2110 on tracks 2140, 2145. The scraper 2130 may only include a scraping surface on the portion of scraper 2130 that is movable across cleanable portion 2110. Additionally, it is not required that two tracks be utilized. The scraper could be movable within a single track.

Scraper 2130 may be moved by any of a variety of methods, including using the foot of a user to engage with the scraper to move the scraper on the tracks.

Floor mat 2100 also includes a catch basin 2150 that may be included at one or both ends of tracks 2140, 2145. Catch basin(s) 2150 includes a recess into which is deposited the shavings from cleanable portion 2110 after scraper 2130 scrapes the cleanable portion. Scraper 2130 moves the shavings off of the cleanable portion and into the catch basin 2150. The shavings from the cleanable portion deposited into the catch basin may be removed from the catch basin in any of a variety of ways, including, for example, by vacuuming the shavings from the catch basin or removing a detachable catch basin, throwing away the contents from the catch basin, and reinstalling the catch basin.

As can be understood, as the cleanable portion is shaved, the scraper is commensurately lowered on tracks 2140, 2145 such that the surface of the scraper that engages with the cleanable portion remains engaged with the cleanable portion. As such, for example, the scraper may be mounted on a ratchet mechanism such that, as the scraper is moved across a complete width of the floor mat, the scraper actuates the ratchet such that the ratchet lowers the scraper. Alternatively, the scraper could remain in the same relative position with respect to the tracks and the tracks could be ratcheted lower with respect to the base portion and cleanable portion. Additionally, the blade surface of the scraper could be lowered with respect to the scraper's structure such that the blade is moved relative to the cleanable portion and the base portion but the scraper remains in the same relative position with respect to the tracks and the cleanable portion and the base portion.

Additionally, it is not required that a base portion be utilized in the embodiment for floor mat 2100. The cleanable portion alone can be utilized with the tracks adjacent the cleanable portion and the scraper movable on the tracks. A catch basin(s) could still be utilized. As such, Figure 22 illustrates an embodiment for floor mat 2200 that includes a cleanable portion 2210 without use of a base portion. Cleanable portion 2210 is adjacent to tracks 2240,

2245. Scraper 2230 is movable on tracks 2240, 2245. A catch basin 2250 may be included at one or both ends of tracks 2240, 2245.

As discussed above, there is no known single chemistry which provides a tacky surface which is tacky both when wet and when dry, and yet not too tacky under either condition. Accordingly, in still further alternative embodiments of the present invention, a dual chemistry may be used for the tacky surface. The dual chemistry combines adhesive compositions of two different types. Adhesive compositions of one type are optimally adhesive when dry. Adhesive compositions of the other type are optimally adhesive when wet. In combination, the adhesive compositions of the two types can be used to provide a top exposed surface that is optimally tacky both when wet and when dry. Thus, when a person's shoe comes in contact with the top exposed surface, the surface provides good tackiness when the surface is either dry or wet, and helps to prevent the person from slipping when the surface is wet.

By "optimally tacky" as used in the foregoing, it is meant that, while either of the two types of adhesive compositions may retain some tackiness when either dry or wet, one type has a best or serviceable level of tackiness under dry conditions, while the other type has a best or serviceable level of tackiness under wet conditions.

A material that comprises the two types of adhesive compositions and presents the top exposed tacky surface that comes in contact with a shoe could assume a variety of embodiments. For example, the dual-chemistry top exposed tacky surface could be the surface of a tacky "insert" or "portion," such as insert 300 described in the foregoing, designed to cooperate with a non-tacky base portion.

On the other hand, the dual-chemistry top exposed tacky surface might not be a surface of a tacky "insert" or "portion" as such. Rather, the dual-chemistry top exposed tacky surface could be the substantially the entirety of the usable surface of an independent floor mat.

Whether the dual-chemistry tacky surface is used in combination with a non-tacky portion, or whether it is substantially the entirety of the usable

surface of an independent floor mat, a separate structural member for an anti-slip component does not need to be used in conjunction with the tacky surface to prevent slipping on the tacky surface when the tacky surface becomes wet. On the other hand, if desired, a separate structural member for an anti-slip component could be used with the tacky surface.

Generally, the material that presents the tacky surface comprises a combination of components having chemistries that respectively are optimally tacky when dry or optimally tacky when wet, such that the combination as a whole presents a top exposed tacky surface that retains a serviceable level of tackiness when either wet or dry. More particularly, when the tackiness of components having a chemistry which is optimally tacky when dry is reduced due to the presence of moisture, the loss of tackiness is compensated for by the components having a chemistry which is optimally tacky when wet. On the other hand, when the tackiness of components having a chemistry which is optimally tacky when wet is reduced due to the absence of moisture, the loss of tackiness is compensated for by the components having a chemistry which is optimally tacky when dry

The components could be combined in a pattern of alternating regions with tacky-when-dry properties and tacky-when-wet properties, respectively. The components could be combined such that the composite material is segmented into regions with distinct characteristics such that the material has a substantially non-uniform composition. On the other hand, the components could be combined with a fine granularity, such that the material has a substantially uniform composition.

Fig. 23 illustrates one possible embodiment of a multi-layer assembly 10 including a material that presents a top exposed tacky surface that is tacky when either wet or dry. The layers include a top layer 11, which comprises a material that presents a top exposed tacky surface that is tacky both when wet and when dry. The material comprises at least three types of distinct "domains." A "domain," with respect to a composition of the top layer 11, refers to a discrete constituent segment of the top layer with chemical properties distinct from other discrete constituent segments.

The domains in top layer 11 include a tacky domain with pressure-sensitive adhesive characteristics and high surface energy. This tacky domain could comprise, for example, copolymers of alkyl methacrylates and difunctional co-monomers such as acrylamides, epoxy acrylates, or urethane terminated acrylates and pressure-sensitive polysiloxane derivatives.

A second domain of the top layer 11 is a non-tacky hydrophobic domain of low surface energy. This non-tacky hydrophobic domain could comprise, for example, polyalkyl fluroacrylates, acrylic terminated fluoroacrylamides, or fluorosulfonamides, polysiloxanes derivatized with one or two acrylate groups, celluloses derivatized with acrylates, styrene butadiene copolymers or acyclic acrylates or methacrylates. The methacrylates could include, for example, cyclohexane methacrylate, norbornene methacrylate, or isobornyl methacrylate.

A third domain of the top layer 11 is a hydrophilic domain. The hydrophilic domain could comprise, for example, hydroxyethyl methacrylate, polyacrylic and methacrylic acids and their salts, polyvinyl alcohol, polyoxymethylenes, polyamides, polyesters and polyimides of unsaturated dicarboxylic acids.

In the top layer 11, tacky domains could be cross-linked, and hydrophilic domains could be cross-linked, with a cross-link density, respectively, ranging from 5-20 mole per cent. The material of the top layer is either in an elastomeric or a leathery state in a range of temperatures in which the floor mat would be in service. A desired range of glass transition temperatures is 5-25 °C.

In the top layer 11, a plurality of tacky domains are interspersed with a plurality of hydrophilic domains. The hydrophilic domains modulate the overall tackiness of the top layer 11, by causing a tackiness of the top layer 11 in a dry state to be substantially equal to a tackiness of the top layer 11 in a wet state.

A function of the hydrophobic domains of low surface energy is to prevent the formation of a continuous film of water over the top layer, and therefore increase the rate of drainage. The hydrophobic domains also

enhance the pressure dependency of the tackiness of the top layer, thereby reducing tackiness in the absence of a force. This can help to prevent excessive tackiness when pressure is applied as the floor mat is actually being used, and to prevent the tacky surface collecting an excessive amount of airborne particulate matter.

The overall morphology of polymeric layer 11 is micellar, with the hydrophobic domains being substantially at or near the surface of the layer, and the hydrophilic and tacky domains being substantially below the surface of the layer. The hydrophilic and the tacky domains migrate to the surface under wet conditions, and together, provide the tackiness needed to attract dirt, bacteria and the like from footwear or other surface to be cleaned, and to help prevent slipping on the tacky surface when it is wet.

In fabricating the top layer 11, domain formation can be enhanced through the use of solvent-induced crystallization. Depending upon the chosen method of manufacturing or assembly of the tacky portion, further enhancements may be possible through selective orientation of the domains during the extrusion, laminating or application process of the top layer 11.

In addition to a top layer 11 as described above, the multi-layer assembly 10 could also include at least one hydrophobic layer 12. On one side thereof, the hydrophobic layer 12 could be adjacent to the top layer 11. The hydrophobic layer 12 could be made of a hydrophobic copolymer. Examples of such a hydrophobic copolymer include methyl methacrylate copolymers, a styrene butadiene co-polymer, and polyalkyl or polyaryl siloxanes. The hydrophobic layer 12 could be bonded to the top layer 11 by means of, for example, an acrylic adhesive. The glass transition temperature of the hydrophobic layer may be in the range 5-150 °C.

The hydrophobic layer 12 is designed to efficiently transport water from the top layer 11. The composition of the hydrophobic layer 12 is selected to minimize solubility of water and maximize its diffusivity in the hydrophobic layer 12. Polysiloxanes as constituents of the hydrophobic layer 12 are especially desirable from this point of view. It is also important to minimize the swelling characteristics of the hydrophobic layer 12 in the presence of water,

because the desired function of this layer is to promote drainage and remain relatively dry.

On a side opposite the side adjacent to the top layer 11, the hydrophobic layer 12 may be adjacent to a hydrophilic layer 13 made of polyvinyl alcohol, polyoxymethylenes, polyhydroxy esters or amides. The cross-link density of this hydrophilic layer 13 could be between 10-30 mole per cent, and its glass transition temperature could be in the range –30 °C to 10 °C.

The hydrophilic layer 13 is capable of absorbing water transported to it by the hydrophobic layer 12. The hydrophilic layer 13 may be adhesively bonded to adjacent layers. Absorption of water by the hydrophilic layer increases its thickness. The composition and cross-link density of the hydrophilic layer may be selected so that this layer can hold up to twice its weight in water (swelling ratio 200%). A function of the hydrophilic layer is to act as a reservoir of water, when removal of water through evaporation is slow. At the same time, the cross-link density and functionality of the hydrophilic layer is carefully controlled so that it does not unduly retain moisture.

The multi-layer assembly 10 could further include a bottom layer 14 for contact with a floor. The bottom layer 14 could be made of a wear-resistant, anti-skid polymer such as a polyurethane, a styrene butadiene copolymer, or a polycarbonate. Other materials suitable for forming the bottom layer 14 include acrylic terminated aromatic polyurethanes and epoxides. The bottom layer 14 could generally be cross-linked highly (e.g., 10-50 mole per cent), and its glass transition temperature, when measurable, could be below 5 °C and in any case below 10C. The bottom layer 14 could be formed so as to have a high surface energy, so that it does not lose all affinity to a floor surface even in the presence of a film of water on the floor surface.

The bottom layer 14 could be especially useful if the multi-layer assembly 10 were being used as an independent floor mat. On the other hand, if the multi-layer assembly 10 were being used as an insert in combination with a non-tacky portion, the bottom layer 14 might not be present. Instead, an adhesive might be used on a surface of hydrophilic layer 13 for contacting the

non-tacky portion, to ensure adhesion of the multi-layer assembly 10 to the non-tacky portion.

The top layer 11 could be about 50-500 microns in thickness. The hydrophobic layer 12 could be about 100-1000 microns in thickness, and the hydrophilic layer 13 could be about 250-1500 microns in thickness. The bottom layer 14 could be approximately 250-1000 microns in thickness.

The multi-layer assembly 10 could be embossed with a pattern to increase surface area, and could be perforated with a pattern of holes (2-10 mm in diameter) to provide drainage.

A multi-layer assembly 10 could be assembled by manufacturing each of the above-described layers separately, and then bonding them together using conventional processes. Alternatively, for example, the top layer 11 could be fabricated first, and then the other layers could be successively applied or bonded to the top layer 11 and to each other.

According to other alternative embodiments, the top layer 11 could comprise a material having a uniform composition. By uniform composition, it is meant that the material is not divided into domains, but instead is more finely grained such that the material has chemical properties that are substantially constant throughout the material. The chemical properties are such that the material can absorb water while retaining tackiness.

For example, the material of uniform composition in top layer 11 could be made of polymers, such as block copolymers or a grafted copolymer. The polymers could be pressure-sensitive adhesives coated or grafted with hydrophilic monomers followed by a further grafting of a fluoroacrylate. Alternatively, the material of uniform composition could comprise a mixture of pressure-sensitive adhesives with hydrophilic fillers such as fibers or microspheres to bind water.

As noted above, the multi-layer assembly could be perforated for improved water drainage. Figure 24 illustrates one embodiment of a perforation pattern formed in a multi-layer assembly 15 comprising four layers as described above. Circular holes 16 are punched, cut, or drilled through all four layers. While circular holes are shown by way of example, the holes could be of any

arbitrary shape.

Additional embodiments of the present invention could utilize two fundamentally different adhesive compositions arranged in some arbitrary pattern.. A first adhesive composition could be pressure-sensitive and tacky when dry. A second adhesive composition could be hydrophilic and tacky when wet. The pattern could be a pattern of regions of the first adhesive composition alternating with the second adhesive composition. Examples of tacky-when-dry adhesives include poly(ethylene-co-vinylacatate) and polyvinylbutyral. Examples of tacky-when-wet adhesives include mixtures containing natural and synthetic rubbers in the presence of plasticizers mixed with hydrocolloid gums and the following class of chemistries: co-polymers of two amino ethyl ethacrylate and nbutly methacrylate.

Figure 25 illustrates a perspective view of a cross section of a multi-layer assembly 17 utilizing two fundamentally different adhesive compositions as described above. A top layer 18 comprises a checkerboard pattern 19 of tacky-when-wet adhesives alternating with tacky-when-dry adhesives. The checkerboard pattern is shown only by way of example and other alternating patterns are contemplated in the present invention. A bottom layer 20 is a wear-resistant anti-skid layer for contacting a floor. The bottom layer 20 could be especially useful if the multi-layer assembly 17 were being used as an independent floor mat. On the other hand, if the multi-layer assembly 17 were being used as an insert in combination with a non-tacky portion, the bottom layer 20 might not be present. Instead, an adhesive might be used on a surface of layer 18 for contacting the non-tacky portion.

Figure 26 is perspective view of a cross section of a multi-layer assembly 21 illustrating yet another embodiment of the present invention. A top layer 22 comprises a tacky-when-dry adhesive. A second layer 23 comprises a hydrophilic tacky-when- wet adhesive. A bottom layer 24 is a wear-resistant anti-skid layer for contacting a floor.

Holes 25 are formed in the top layer 22 to enable contact by the sole of a shoe or other surface to be cleaned with the tacky-when-wet adhesive at the same time that the tacky-when-dry adhesive is contacted. Since the

second layer 23 is also hydrophilic, it will swell and fill the holes 25 when wet, providing greater access to the tacky-when-wet adhesive of layer 23 by a surface to be cleaned, such as the sole of a shoe.

Fig. 27 illustrates another embodiment wherein the material that presents the top exposed tacky surface has a substantially uniform composition. The material comprises a blend of materials that are tacky when dry with materials that are tacky when wet. The tacky-when-wet materials include certain hydrocolloid gums (e.g., gaur gum, locust bean gum, and the like). Since these hydrocolloid gums have a large capacity for absorbing moisture, they should provide good wet adhesive or tackiness. The tacky-when-dry materials, which are also pressure-sensitive, could include synthetic and/or natural rubbers in the presence of plasticizers. The synthetic and/or natural rubbers could be, for example, polyisobutylenes, natural rubber, silicone rubbers, acrylonitrile rubbers, polyurethane rubbers, butyl rubber elastomer, and the like.

The strength and uniformity of a blend of tacky-when-wet and tacky-when-dry materials as described above could be increased by the introduction of a cohesive strengthening agent to the blend. The cohesive strengthening agent could, for example, be one or more of natural and artificial fibrous materials such as wood cellulose, cotton, or Dacron.

In Fig. 27, a top layer 27 of a multi-layer assembly 26 comprises a blend of pressure-sensitive dry adhesive with a hydrocolloid gum, mixed with a cohesive strengthening agent. Due to the cohesive strengthening agent, a surface 28 of the top layer 27 has a uniform appearance of a single material. A bottom layer 29 is a wear-resistant anti-skid layer for contacting a floor. The bottom layer 29 might not be present if the layer 27 is being used as an insert.

Any of the materials that present a top exposed tacky surface that is tacky both when wet and when dry as described above could be used in combination with each other, or in combination with any of the other layers described. For example, either of layers 18 or 27 could be used in combination with a hydrophobic layer and a hydrophilic layer.

As described previously, in an embodiment, the floor mat includes

a tacky surface having a top exposed surface with a surface area and a substantially non-paper anti-slip component disposed within the surface area of the top exposed surface of the tacky surface to prevent slipping on the tacky surface when wet. Thus, the anti-slip component is in operable association with the top exposed surface of the tacky surface to reduce slippage of a person on the top exposed surface who steps on the top exposed surface when the top exposed surface is wet. The anti-slip component may be integrally included in the top exposed surface.

The anti-slip component may include a plurality of channels as can be seen in Figure 5 which are comprised of a non-tacky material where the plurality of channels is extendible from the top surface of the tacky surface in response to a person stepping on the tacky surface. Alternatively, the floor mat may include an anti-slip component that is extendible from the top surface of the tacky surface in the absence of a person standing on the tacky surface, such as the treads described previously. Thus, the treads may be elongated members that have a length extending across the top exposed surface of the tacky surface which is substantially greater than a height that the treads extend above the top exposed surface of the tacky surface.

Additionally, the anti-slip component may be the apertures illustrated in Figure 11.

The various embodiments for an anti-slip component may be comprised of a non-tacky material, e.g., non-tacky members, and a water resistant material. Thus, the anti-slip components may be water resistant. The anti-slip components may also be comprised of a material such that they remain functional to prevent slipping on the tacky surface after a plurality of uses. As such, the anti-slip component may be comprised of a sufficiently rigid material such that a configuration of the anti-slip component is substantially maintained after being stepped on a plurality of times by a person and may be comprised of a material having a composition which is substantially maintained after having been stepped on a plurality of times by the person.

As was also described previously, in an embodiment, the floor mat includes a base portion having a non-tacky exposed top surface area 250 for

contacting the soles of a person's shoes thereon and a tacky portion associated with the non-tacky exposed top surface area of the base portion and having a tacky exposed top surface area 350 for contacting the soles of the shoes thereon. As can be seen at least in Figure 1, the base portion non-tacky exposed top surface area 250 is at least as large as the tacky portion tacky exposed top surface area 350.

The floor mat's base portion may include a cushioning component such that when the person's shoes applies pressure to the base portion and the tacky portion, both the base portion and the tacky portion conform to a topography of a bottom of the person's shoes. The tacky portion may also include a tacky surface on a bottom side of the tacky portion.

In various embodiments, the base portion may circumscribe the tacky portion, as can be seen in Figure 1, or may be located adjacent to the tacky portion, as can be seen in Figure 14.

As can also be seen in at least Figure 1, the floor mat has a base portion that has a continuous non-tacky exposed top surface area 250 for contacting the soles of a person's shoes thereon and a tacky portion having a tacky exposed top surface area 350 for contacting the soles of the shoes thereon. As can be seen also in Figures 15 and 16, the non-tacky exposed top surface area of the base portion and the tacky exposed top surface area of the tacky portion are both of a size such that an entire sole of an adult-sized shoe is receivable thereon. The continuous non-tacky exposed top surface area 250 of the base portion has a first side area 252 disposed on a first side 352 of the tacky exposed top surface area of the tacky portion and a second side area 254 disposed on a second, opposing side 354 of the tacky exposed top surface area of the tacky portion. The first side area of the continuous non-tacky exposed top surface area of the base portion is larger than the second side area of the continuous non-tacky exposed top surface area of the base portion.

All of the disclosed embodiments are illustrative of the various ways in which the present invention may be practiced. Additionally, any of the disclosed embodiments for the components of the floor mat, e.g., the base portion, the tacky portion, the graphic display, and thus all of the features

associated with these components, may be combined in any embodiment of the present invention and the present invention is not limited to only the particular combined embodiments disclosed. Other embodiments can be implemented by those skilled in the art without departing from the spirit and scope of the present invention.

What is claimed is:

1. A floor mat comprising a top exposed tacky surface, wherein said top exposed tacky surface is formed by combining a first adhesive composition that is tacky when dry with a second adhesive composition that is tacky when wet.

2. The floor mat of claim 1, further comprising an anti-slip component that is a separate structural member from said top exposed tacky surface

3. The floor mat of claim 2, wherein said anti-slip component is a tread.

4. The floor mat of claim 3, wherein said top exposed tacky surface includes an aperture therein and wherein said tread extends through said aperture.

5. The floor mat of claim 3, wherein said tread extends above said top exposed tacky surface.

6. The floor mat of claim 3, wherein said tread extends from a surface of a member disposed under said top exposed tacky surface.

7. The floor mat of claim 3, wherein said tread is an elongated member that has a length extending across said top exposed tacky surface which is substantially greater than a height that said tread extends above said top exposed tacky surface.

8. The floor mat of claim 3, wherein said tread includes a plurality of grooves along the length of the tread.

9. The floor mat of claim 3, wherein said tread is water resistant.

10. The floor mat of claim 2, wherein said anti-slip component remains

functional to prevent slipping on said top exposed tacky surface after a plurality of uses.

11. A floor mat of claim 1, wherein a material that presents said top exposed tacky surface comprises a plurality of material domains such that a combination of said domains is tacky both when dry and when wet.

12. The floor mat of claim 11, wherein said plurality of material domains constitutes at least a portion of a top layer of said floor mat, and wherein said floor mat further comprises a non-tacky hydrophobic layer adjacent to said top layer and a hydrophilic layer adjacent to said hydrophobic layer.

13. The floor mat of claim 12, wherein said floor mat further comprises a wear-resistant anti-skid layer for contacting a floor

13. The floor mat of claim 11, wherein said plurality of material domains includes a tacky pressure-sensitive domain, a non-tacky hydrophobic domain, and a hydrophilic domain.

14. A floor mat of claim 1, wherein said first and second adhesive compositions are arranged in a pattern of alternating regions.

15. The floor mat of claim 14, wherein said first adhesive composition is pressure-sensitive.

16. The floor mat of claim 14, wherein said second adhesive composition includes at least one of natural and synthetic rubbers.

17. The floor mat of claim 14, wherein said alternating regions constitute at least a portion of a top layer of said floor mat, and wherein said floor mat further comprises at least a wear-resistant anti-skid layer for contacting a floor.

18. The floor mat of claim 1, wherein a material presenting said top exposed tacky surface has a uniform composition.

19. The floor mat of claim 18, wherein said uniform composition includes pressure-sensitive adhesives coated with hydrophilic monomers.

20. The floor mat of claim 18, wherein said uniform composition includes pressure-sensitive adhesives mixed with hydrocolloid gums.

21. The floor mat of claim 20, wherein said uniform composition further includes a cohesive agent.

22. The floor mat of claim 1, wherein said floor mat is embossed with a pattern.

23. The floor mat of claim 1, wherein said floor mat is perforated.

24. A floor mat comprising:

a top layer comprising a plurality of material domains such that a combination of said domains is tacky both when dry and when wet;

a non-tacky hydrophobic layer adjacent to said top layer;

a hydrophilic layer adjacent to said hydrophobic layer; and

a wear-resistant anti-skid layer for contacting a floor

25. A floor mat comprising:

a top layer comprising alternating regions of a first adhesive composition that is tacky when dry, and a second adhesive composition that is tacky when wet; and

a wear-resistant anti-skid layer for contacting a floor.

26. A floor mat comprising;

a top layer of material which is tacky when dry;

a second layer of material adjacent to said top layer, said second layer being tacky when wet; and

a wear-resistant anti-skid layer for contacting a floor;

wherein said top layer has holes for allowing a surface to be cleaned to contact said second layer while also contacting said top layer.

27. The floor mat of claim 27, wherein said second layer is hydrophilic.

28. A floor mat comprising:

a top layer comprising a plurality of materials blended to produce a uniform texture, wherein at least a first of said plurality of materials is a pressure-sensitive dry adhesive, and at least a second of said plurality of materials is a hydrocolloid gum; and

a wear-resistant anti-skid layer for contacting a floor.

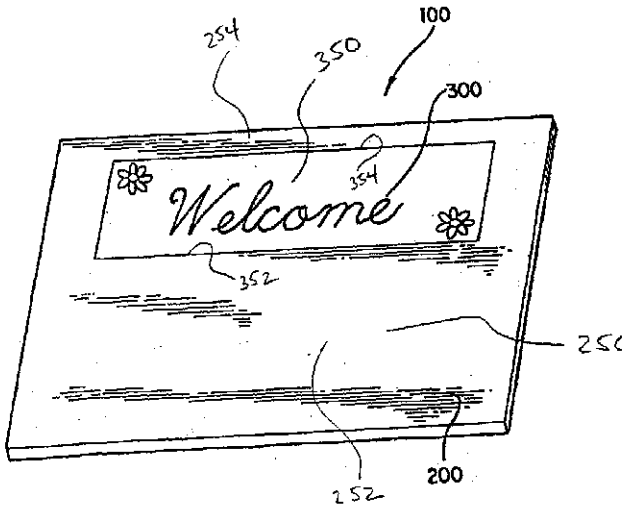

FIG. 1

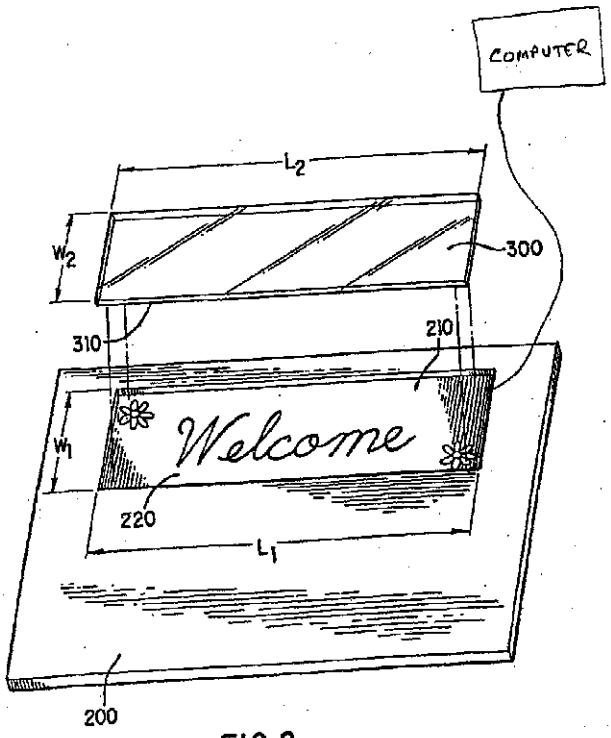

FIG. 2

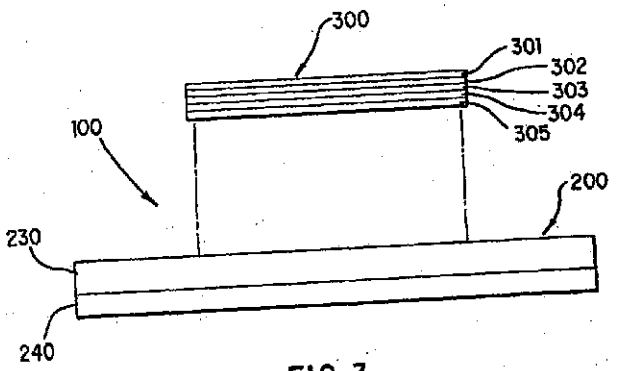

FIG. 3

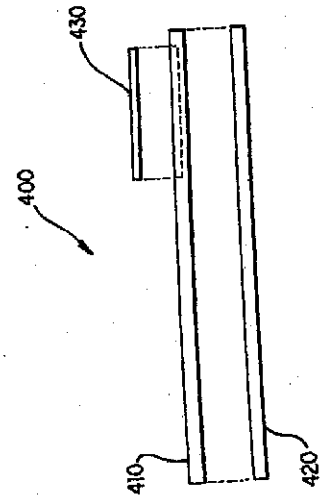

FIG. 4

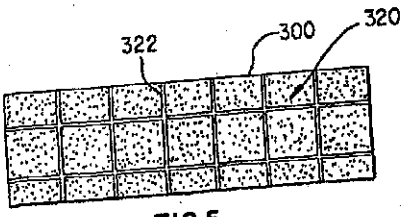

FIG.5

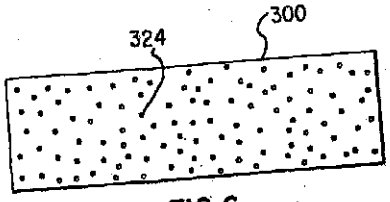

FIG.6

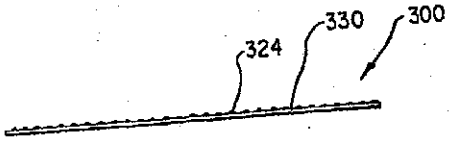

FIG.7

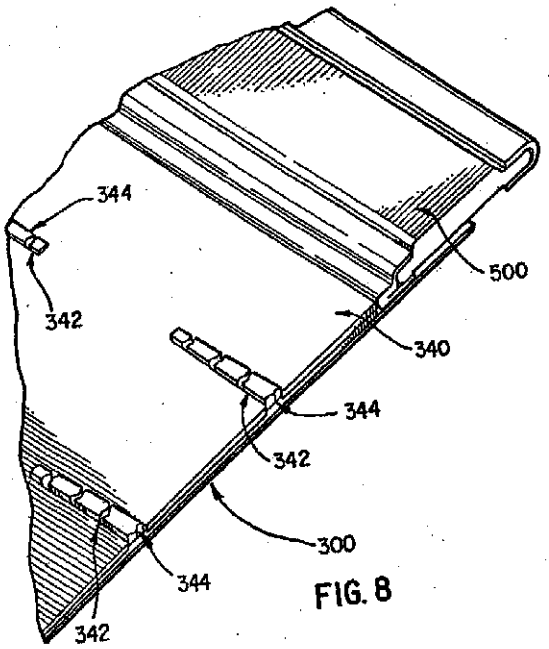

FIG. 8

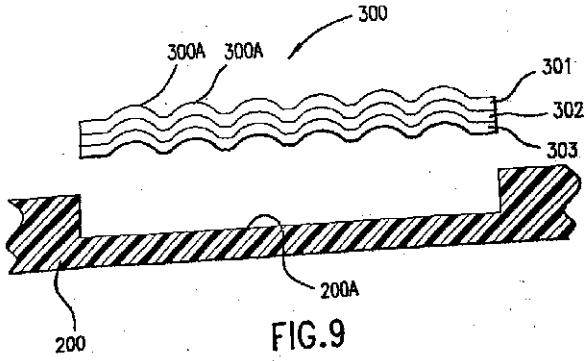
300
300A
300A
301
302
303
200A
200

FIG.9

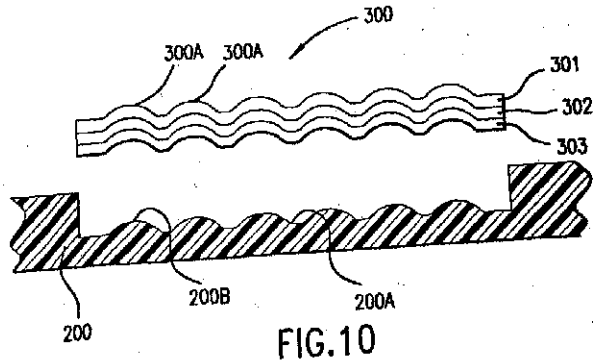
300
300A
300A
301
302
303
200B
200A
200

FIG.10

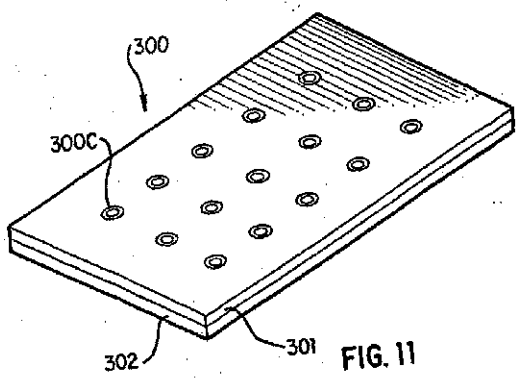

FIG. 11

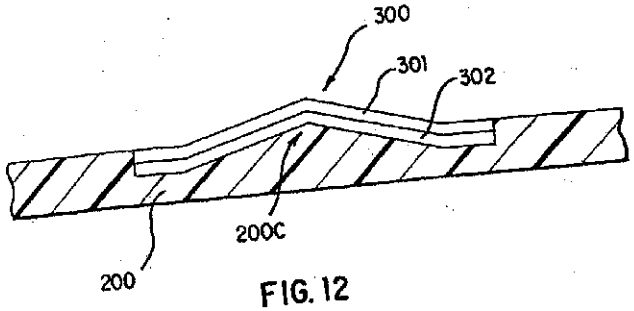

FIG. 12

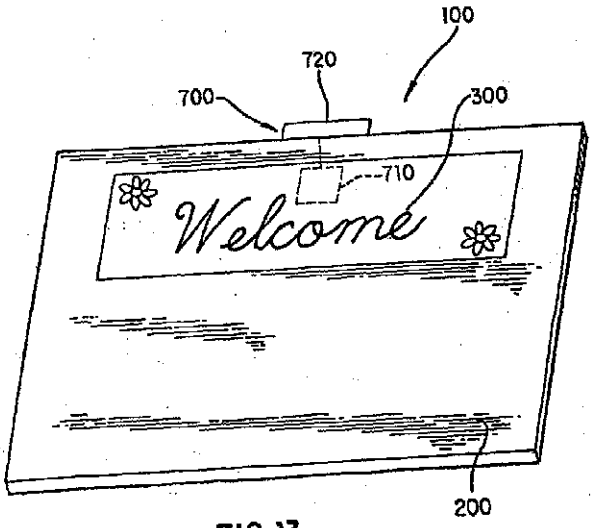

FIG. 13

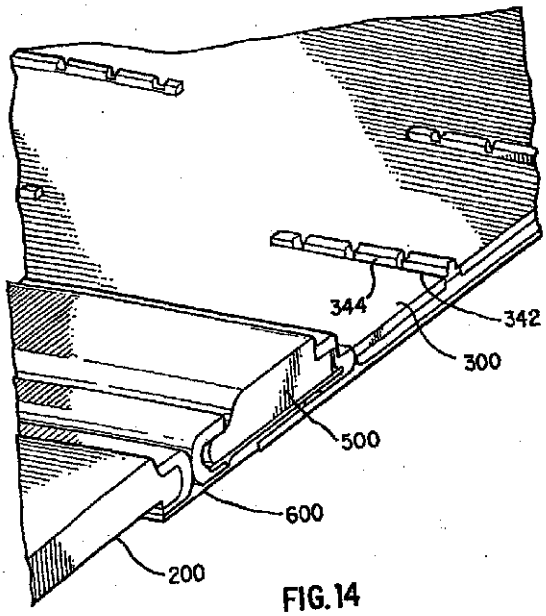

FIG. 14

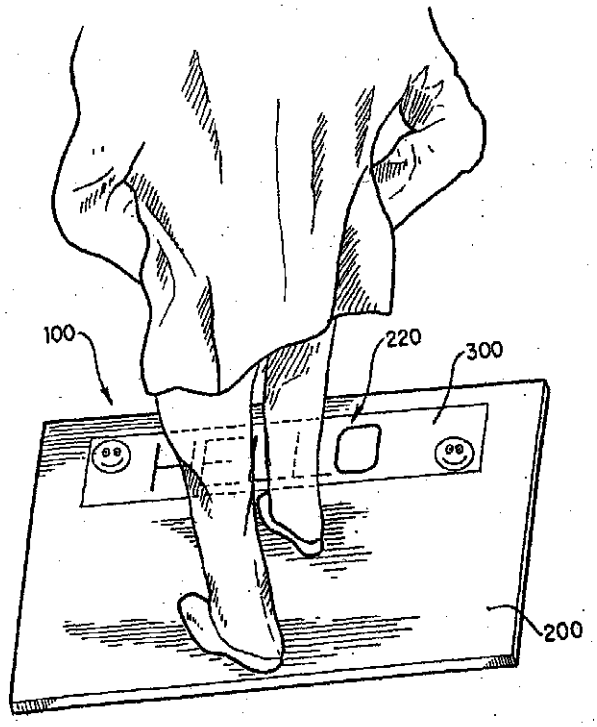

FIG. 15

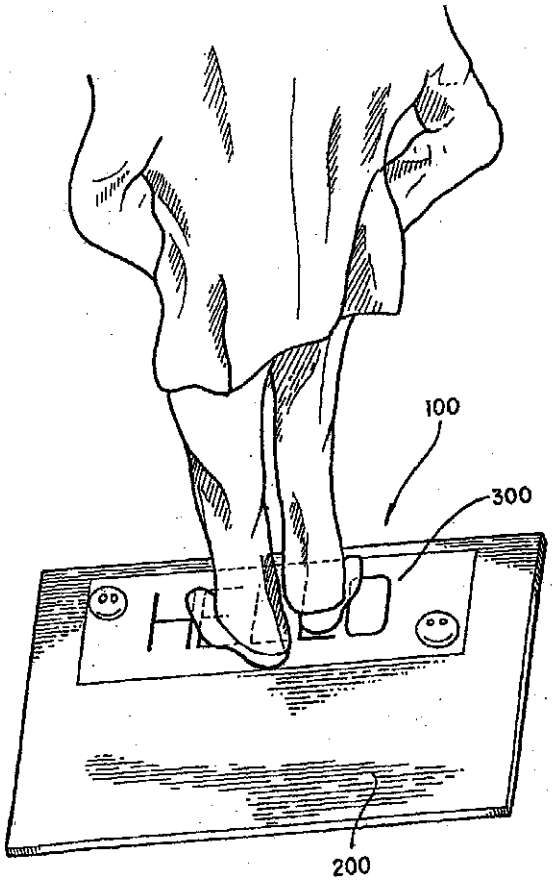

FIG. 16

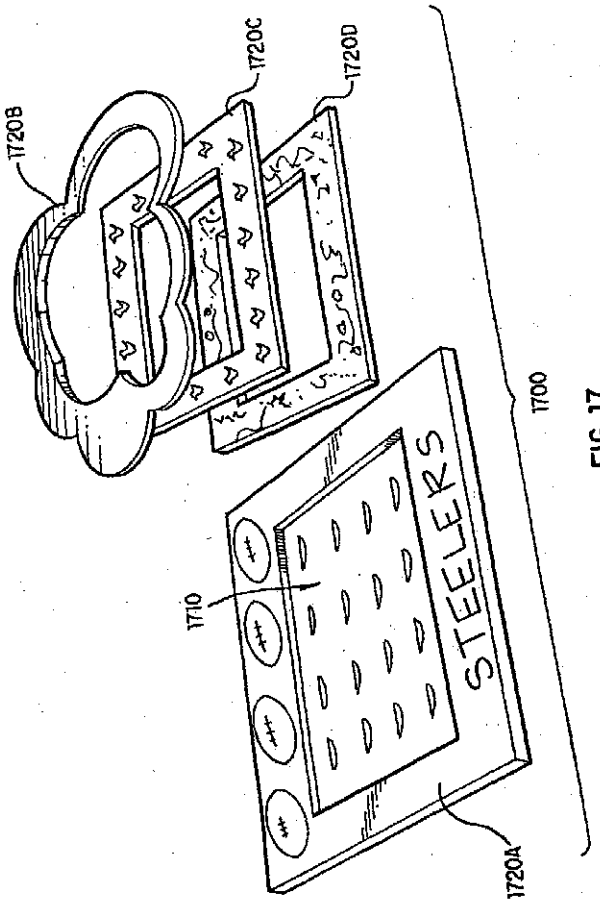

FIG. 17

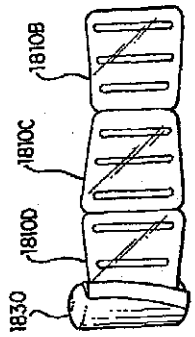

FIG. 19

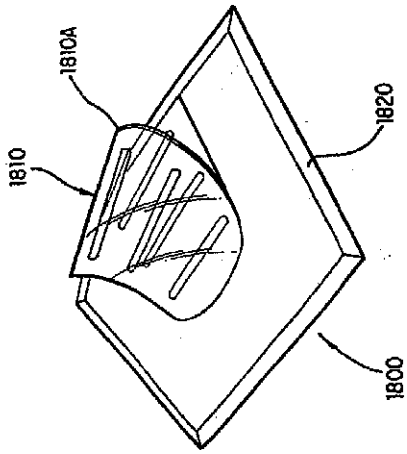

FIG. 18

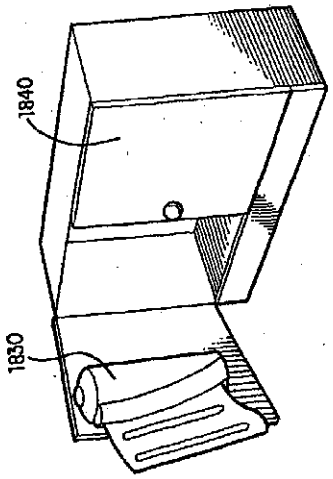

FIG.20

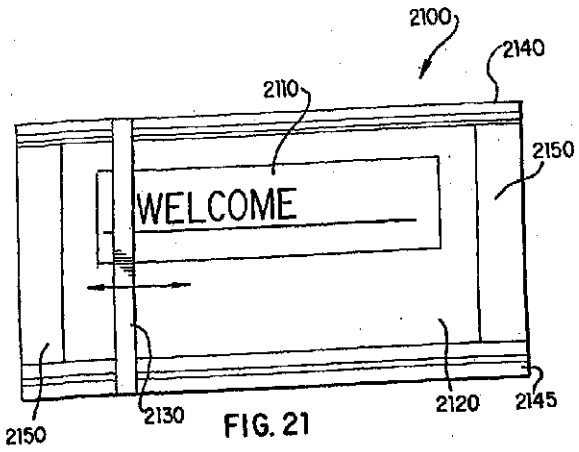
2100
2140
2110
2150
WELCOME
2150
2130
2120
2145

FIG. 21

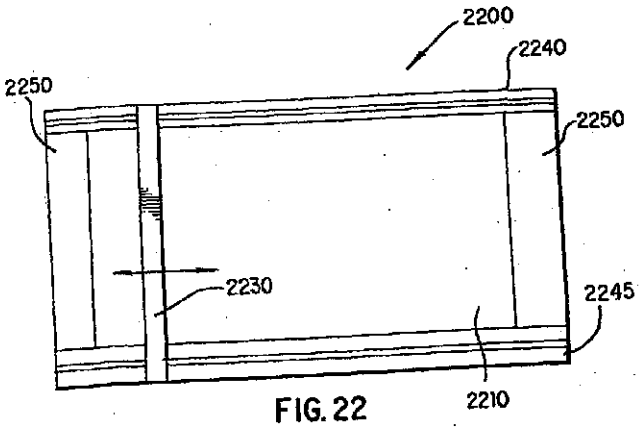
2200
2240
2250
2250
2230
2245
2210

FIG. 22

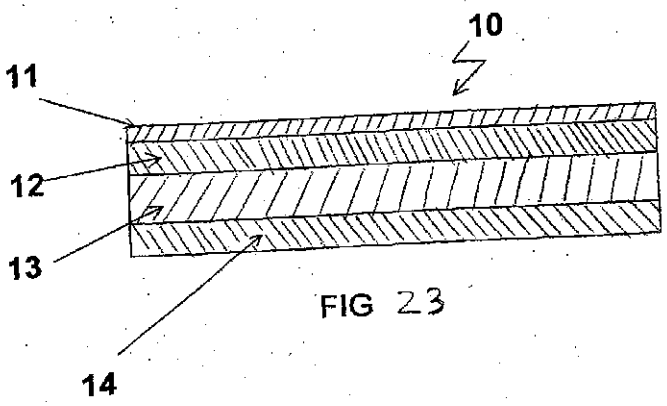

FIG 23

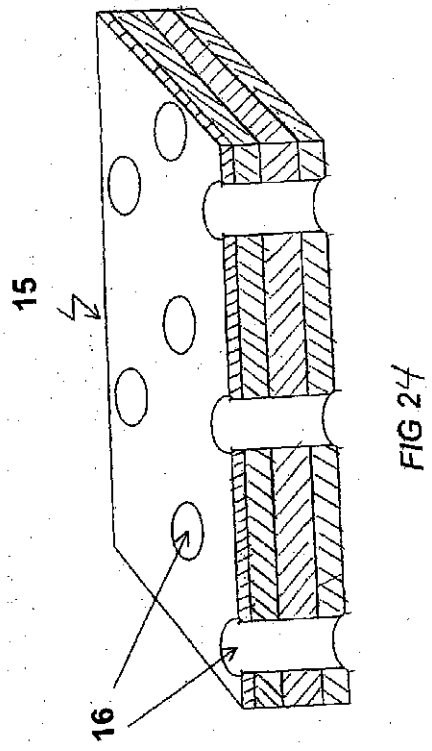

FIG 24

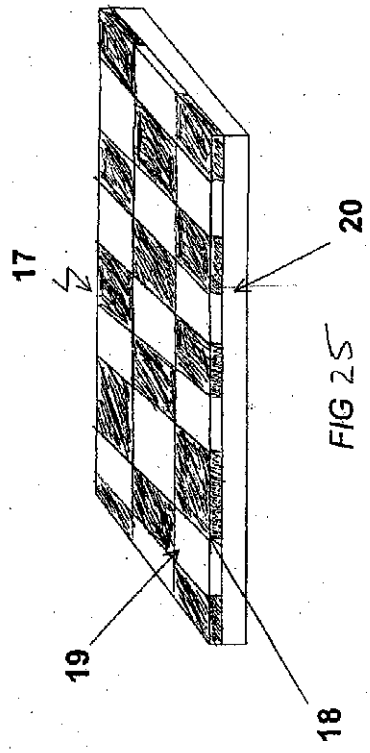

FIG 25

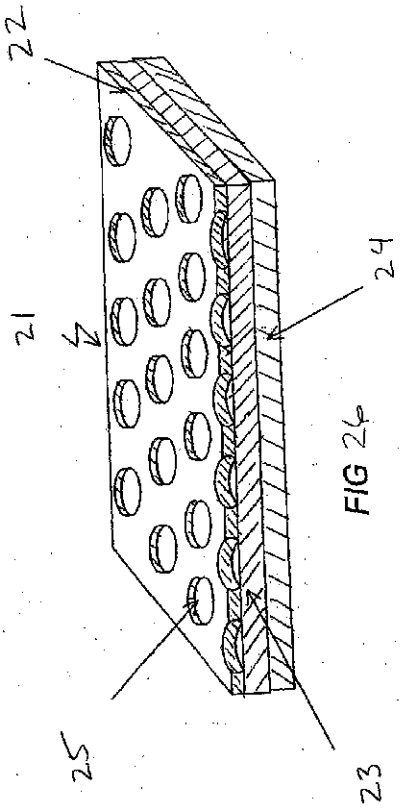

FIG 26

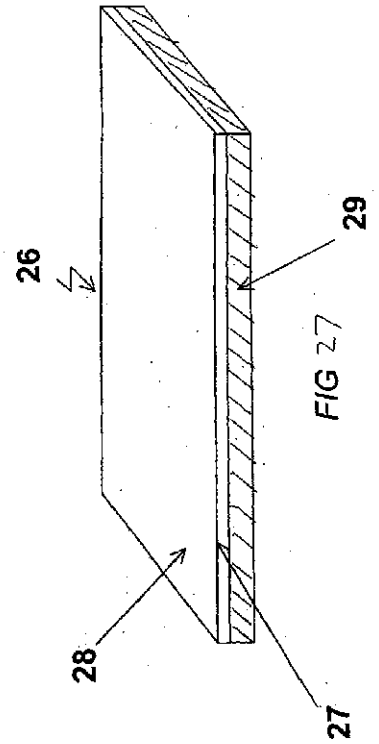

FIG 27

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(74) Agents: WELLS, William, K. et al.; Kenyon & Kenyon, 1500 K Street, N.W., Suite 700, Washington, DC 20005 (US).

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(84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

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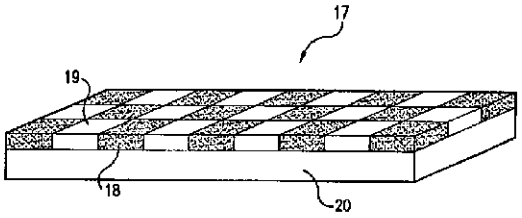
[Continued on next page]

(54) Title: FLOOR MAT INCLUDING TACKY SURFACE WITH TACKY WHEN DRY AND TACKY WHEN WET PROPERTIES



(57) Abstract: An advanced floor mat (100) is disclosed. In an embodiment of the present invention, the floor mat includes a cleanable portion (300). The floor mat may also include a water dissipative component (230), a water absorbing component (400), a cushioning component (240), customized graphics (300), a transparent cleanable portion, a tacky surface (301, 302, 303) on the cleanable portion, an antibacterial composition (100), an antifungal composition (100), and a fragrance (100). The cleanable portion may be creditble and may include a plurality of cleanable reusable layers. If a tacky surface is included in the floor mat, an anti-slip feature may be associated with the tacky surface to help prevent slipping on a possibly wet tacky surface. The tacky surface may comprise a material with a dual chemistry such that the tacky surface is tacky both when dry and when wet. Additionally, a sensor (700) system may be included in the floor mat to assist a user in identifying when the floor mat may require cleaning.

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WO 02/038029 A3

before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

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(71) Applicant: TECH MATS LLC. [US/US]; 2840 Hershberger Road, Suite A, Roanoke, VA 24017 (US).

(72) Inventors: BLUM, Ronald, D.; 5320 Silver Fox Road, Roanoke, VA 24014 (US). BLUM, Bradley, J.; 3002 Rosalind Avenue, Roanoke, VA 24014 (US). DUSTON, Dwight, P.; 59 Fairlane, Laguna Niguel, CA 92677 (US). KOKONASKI, William; 1807 44 Street, N.W., Gig Harbour, WA 98335 (US). KOPF, Peter, W.; 29 Firecut Lane, Sudbury, MA 01776 (US).

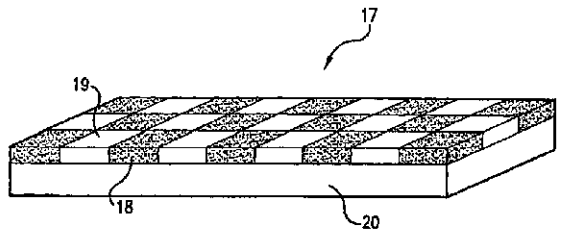
(74) Agents: WELLS, William, K. et al.; Kenyon & Kenyon, 1500 K Street, N.W., Suite 700, Washington, DC 20005 (US).

(81) Designated States *(national)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW.

(84) Designated States *(regional)*: ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

[Continued on next page]

(54) Title: FLOOR MAT INCLUDING TACKY SURFACE WITH TACKY-WHEN-DRY AND TACKY-WHEN-WET PROPERTIES



(57) Abstract: An advanced floor mat (100) is disclosed. In an embodiment of the present invention, the floor mat includes a cleanable portion (300). The floor mat may also include a water dissipation component (230), a water absorbing component (420), a cushioning component (240), customized graphics (500), a transparent cleanable portion, a tacky surface (301, 302, 303) on the cleanable portion, an antibacterial composition (700), an antifungal composition (700), and a fragrance (700). The cleanable portion may be cordible and may include a plurality of cleanable reusable layers. If a tacky surface is included in the floor mat, an anti-slip feature may be associated with the tacky surface to help prevent slipping on a possibly wet tacky surface. The tacky surface may comprise a material with a dual chemistry such that the tacky surface is tacky both when dry and when wet. Additionally, a sensor (700) system may be included in the floor mat to assist a user in identifying when the floor mat may require cleaning.

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FLOOR MAT INCLUDING TACKY SURFACE WITH TACKY-WHEN-DRY AND TACKY-WHEN-WET PROPERTIES

This application claims the benefit under 35 USC section 119(e) of U.S. provisional application 60/246,602, filed November 8, 2000. Further, this application is a continuation-in-part of U.S. application no. 09/553,234, filed April 19, 2000 and issued May 22, 2001 as U.S. patent no. 6,233,776. Application no. 09/553,234 is a continuation-in-part of U.S. application no. 09/418,752, filed October 15, 1999, which is a continuation-in-part of U.S. application no. 09/304,051, filed May 4, 1999 and issued April 24, 2001 as U.S. patent no. 6,219,876.

Background and Discussion of the Invention

The present invention relates to a floor mat. More specifically, the invention provides a floor mat that includes a cleanable portion. The floor mat may also include a water dissipation component, a water absorbing component, a cushioning component, customized graphics, a transparent cleanable portion, a tacky surface on the cleanable portion, an antibacterial composition, an antifungal composition, and a fragrance. The cleanable portion may be erodible and may include a plurality of cleanable reusable layers. If a tacky surface is included in the floor mat, an anti-slip feature may be associated with the tacky surface to help prevent slipping on a possibly wet tacky surface. Additionally, a sensor system may be included in the floor mat to assist a user in identifying when the floor mat may require cleaning.

Floor mats are known for cleaning the soles of a person's shoes who is about to enter a particular area or room. One problem with floor mats in general is how to keep the floor mat sufficiently clean such that it may perform its function of cleaning the person's shoes when, by its very nature, it is purposefully dirtied when performing its function.

Known floor mats may be comprised of a single, unitary piece of material. Whereas these single structure floor mats may be kept clean by, for example, washing the floor mat, it may be required that the entire floor mat be removed from its location for washing and thus, the floor mat is not available where desired while the entire mat is being cleaned. Alternatively, even if the mat can be cleaned in-place, which may not be a possibility if it is located in, for example, a carpeted area, it may be inconvenient to clean the mat in-place.

U.S. Patent Number 3,785,102 to Amos discloses a throw-away pad comprising a plurality of stacked disposable sheets where, when a particular sheet is dirtied, the dirty sheet is removed and disposed of. The next sheet that is exposed after the dirty sheet is discarded is clean and thus, a clean surface is again available. However, there may be problems with comprising the floor mat of disposable sheets. Disposing of each dirty sheet may be uneconomical since each sheet is discarded after it becomes dirty. Additionally, after some finite number of sheets are disposed of, no sheets will remain and thus no effective cleaning surface is available.

U.S. Patent Number 3,785,102 to Amos also discloses that an adhesive can be provided on each sheet's top surface to improve its ability to remove dirt from a person's shoes. However, again, these sheets are not cleanable and therefore are not reusable.

U.S. Patent Number 3,717,897 to Amos et al. discloses a pad for cleaning shoes and wheels. The pad includes a thin water-washable adhesive covering its upper surface for removing dirt from shoes and wheels. Whereas the '897 patent discloses a pad with a water-washable adhesive upper surface, the pad is not known for use in domestic or office-type applications. As stated in the '897 patent, the pad is placed at an entrance doorway leading into a clean room.

Tacky floor mats are by far more popular for utilization in indoor environments that are far removed from exterior outside entrances, such as for clean rooms that are well-within the interior of the building in which they are used, e.g., hospital rooms, computer chip manufacturing spaces, and gymnasiums. Thus, tacky floor mats are not known for use in areas that are adjacent to entrances that lead from the outdoor environment for cleaning the soles of a person's shoes prior to entry into the interior of a building, such as for example in an entry foyer or on an outdoor porch.

Tacky floor mats are not known for use in domestic or office-type applications, e.g., home or business office use, because of several known deficiencies. One of these deficiencies is that their tacky surface will not be as effective if it becomes wet. Therefore, if the tacky surface floor mat was utilized in an outdoor environment, such as the outdoor porch mentioned above, or in an indoor environment that is adjacent to or near an outdoor entrance, such as an entry foyer of a home or business, for cleaning a person's shoes prior to further entering the home or business, the mat is likely to become wet and therefore not effective. The mat could become wet from, for example, the moisture in the atmosphere or from moisture carried on the soles of the person's shoes who steps on the mat. Additionally, if the tacky surface becomes wet it may become slippery and thus cause a hazard for the person who steps on it.

More particularly, over the past several decades, the adhesives that are typically used in tacky surfaces of floor mats have evolved to the point that they have been optimized through commercialization to a certain threshold of tackiness. Nevertheless, even at this optimal threshold, the tacky surface has the deficiency described above, wherein the tacky surface may become slippery when wet.

Efforts to address this problem by tinkering with the chemistry of the adhesives used in the tacky surface have been unavailing. Beyond the optimal threshold of tackiness as described above (that is, if the tacky surface is made tackier), a trip hazard is presented when the surface is dry. On the other hand, below the threshold (that is, if the tacky surface is made less tacky), a slip

hazard is presented when the tacky surface is wet.

In consideration of the foregoing, a single chemistry for an adhesive that provides a tacky surface that is tacky both when wet and when dry is not known. Accordingly, there is a need for a floor mat with a tacky surface that can be utilized in both a wet environment and a dry environment.

Additional deficiencies with using known tacky floor mats for home or office-type applications as discussed above is their likelihood of becoming trip hazards and their lack of aesthetic appeal. In the '897 patent, because the pad is designed for use in clean room environments, it is adhesively adhered to the passageway floor in front of the entrance doorway. This may be satisfactory for retaining the mat in-place in clean room-type of applications, however, if it was attempted to use the '897 pad on a carpeted floor, the pad would not properly adhere to the carpet and thus a trip hazard would be present. This could result in significant liability issues. The '897 pad does not have sufficient mass for it to remain in-place without utilizing an adhesive. Regarding aesthetics, because tacky floor mats are known only for their functional characteristics, and thus for use only in "clean room"-type applications, they are not aesthetically pleasing. Therefore, for at least the above reasons, tacky floor mats are not known for use in home or office-type applications.

Additional drawbacks with known floor mats exist that are directed to issues of customization for a particular purchaser and a lack of additional cleaning properties. A floor mat may be the first object that a visitor to a particular home or business encounters. As such, the owner of the home or business may want to utilize the floor mat to graphically convey an initial greeting or message to the visitor. Whereas floor mats are known that may include a greeting on them, it is not currently known to allow for a particular purchaser to customize the displayed graphic so that the message is tailored to convey a particular message desired by the purchaser. For example, on Halloween the purchaser may want the floor mat to display a "Happy Halloween" message. In another situation, the purchaser may want to greet a particular visitor with a message such as "Hello, Joe". Currently, it is not known to provide a floor mat where an individual can customize the floor mat to

display a particular message that they want to convey and in certain circumstances even change the floor mat's message they want to convey.

An additional problem with known floor mats, as mentioned above, is that they are limited in their ability to clean the soles of a person's shoes. Whereas known floor mats may be capable of removing dirt particles from the shoe's soles, they are not able to disinfect the soles nor provide a scent to the soles to assist in masking any unpleasant odors that may be associated with the shoes.

An additional drawback with known floor mats, even if they are cleanable, is that they do not assist a user in determining when the floor mat may require cleaning. Generally, the owner or custodian of the floor mat does not continuously or regularly monitor the condition of the floor mat with respect to cleanliness. Therefore, the floor mat could require cleaning, and because the owner is not consciously monitoring the condition of the floor mat, there could be a significant period of time before the owner realizes that the floor mat requires cleaning. Therefore, it would be desirable to assist the owner/custodian of the floor mat in determining when the floor mat requires cleaning.

Therefore, it would be desirable to provide an advanced floor mat that could address deficiencies that exist with currently known floor mats. The advanced floor mat of the present invention overcomes deficiencies in the prior art and may include a base portion which incorporates a cleanable portion that is adapted to be removably received within the floor mat. The floor mat may also include features such as a water dissipation capability, a water absorbing capability, a cushioning capability, customized graphics, a transparent portion, a tacky surface on the cleanable portion, an antibacterial composition, an antifungal composition, and a fragrance. The cleanable portion may include the features of being erodible and containing a plurality of cleanable reusable layers. If a tacky surface is included in the floor mat, an anti-slip feature may be associated with the tacky surface to help prevent slipping on a possibly wet tacky surface. Additionally, a sensor system may be included in the floor mat to assist a user in identifying when the floor mat may require cleaning. Other

features will be apparent from the detailed description which follows.

Brief Description of the Drawings

The various features of the invention will best be appreciated by simultaneous reference to the description which follows and the accompanying drawings, in which:

Fig. 1 is a perspective view of a floor mat in accordance with an embodiment of the present invention;

Fig. 2 is an exploded perspective view of the floor mat of Fig. 1;

Fig. 3 is an exploded side view of an alternative embodiment of the floor mat of the present invention;

Fig. 4 is an exploded side view of an alternative embodiment of the floor mat of the present invention;

Fig. 5 illustrates a third alternative embodiment for a tacky insert portion with an anti-slip feature for the floor mat of the present invention;

Fig. 6 illustrates a fourth alternative embodiment for a tacky insert portion with an anti-slip feature for the floor mat of the present invention;

Fig. 7 is a side view of the embodiment for the tacky insert portion with an anti-slip feature of Fig. 6;

Fig. 8 is a perspective view of a fifth embodiment for a tacky insert portion with an anti-slip feature for the floor mat of the present invention;

Fig. 9 illustrates a sixth alternative embodiment for a tacky insert portion with an anti-slip feature for the floor mat of the present invention;

Fig. 10 illustrates the tacky insert portion with an anti-slip feature of Fig. 9 in conjunction with an alternative embodiment for the base portion;

Fig.11 illustrates a seventh alternative embodiment for a tacky insert portion with an anti-slip feature and a water dissipating capability for the floor mat of the present invention;

Fig. 12 illustrates an alternative embodiment for a tacky insert portion and base portion with a water dissipating capability for the floor mat of the present invention;

Fig. 13 illustrates a sensor system that may be utilized in an

embodiment of the present invention;

Fig. 14 is an embodiment for a floor mat where the tacky portion and the non-tacky portion are separable;

Fig. 15 is a perspective view of an embodiment of the floor mat of the present invention as being used in one step of a process for utilizing the floor mat;

Fig. 16 is a perspective view of the floor mat of Fig. 15 as being used in a second step of a process for utilizing the floor mat;

Fig. 17 illustrates an alternative embodiment for a floor mat in accordance with the present invention that includes interchangeable base portions;

Fig. 18 illustrates an alternative embodiment for a floor mat in accordance with the present invention that includes single sheets for the cleanable portion;

Fig. 19 illustrates a roll of sheets that may be utilized with the embodiment of Fig. 18;

Fig. 20 illustrates a storage container that may be utilized with the roll of sheets of Fig. 19;

Fig. 21 illustrates an alternative embodiment for a floor mat in accordance with the present invention that includes a scraper movable on tracks;

Fig. 22 illustrates an alternative embodiment for a floor mat in accordance with the present invention that includes a scraper movable on tracks;

Fig. 23 illustrates an alternative embodiment for a tacky surface in accordance with the principles of the present invention;

Fig. 24 illustrates an alternative embodiment for the tacky surface of Fig. 23;

Fig. 25 illustrates another alternative embodiment for a tacky surface in accordance with the principles of the present invention;

Fig. 26 illustrates another alternative embodiment for a tacky surface in accordance with the principles of the present invention; and

Fig. 27 illustrates another alternative embodiment for a tacky surface in accordance with the principles of the present invention.

Detailed Description

Figure 1 illustrates a first embodiment for a floor mat 100 in accordance with the principles of the present invention. As can be seen in Figure 1, floor mat 100 includes a base portion 200 and a cleanable insert portion 300. As will be further described later in this specification, in this embodiment, cleanable portion 300 is received within base portion 200 and is removable from base portion 200.

Figure 2 illustrates an exploded, perspective view of the floor mat of Figure 1. As can be seen in Figure 2, base portion 200 is formed as a generally flat, planar member and defines a recess 210 within the top surface of base portion 200. Base portion 200 provides sufficient weight and mass for supporting cleanable insert portion 300 and maintaining the floor mat's positioning on the surface on which it is placed. Base portion 200 may include, as will be discussed below, a water dissipation capability, a water absorption capability, and a cushioning capability and may be comprised of materials such as polyurethane, polyisoprene and other cross-linked elastomeric materials, such as nylon-6, molded or woven to form a porous structure. Recess 210 can be configured in any of a variety of geometric configurations, however, in the present embodiment, recess 210 is configured in a rectangular shape. Recess 210 has a length L_1 and a width W_1. The depth of recess 210 is such that it is able to receive within it cleanable insert portion 300 such that when cleanable insert portion 300 is received within recess 210, the top surface of cleanable insert portion 300 lies generally in the same plane as the top surface of base portion 200.

The top surface of base portion 200 may be colored with any color depending upon the desires of a particular purchaser, however, it is preferable that a color be utilized that will minimize the visibility of any dirt that is accumulated by base portion 200. For example, it may be desirable that darker colors be utillzed for the top surface of base portion 200 rather than lighter

colors. However, again, any particular color may be utilized for base portion 200, and particularly the top surface of base portion 200, depending upon the particular desires of an individual. Additionally, the base portion 200 may be either translucent or opaque.

As can be seen in Figure 2, the surface of base portion 200 which defines the bottom of recess 210 may include graphics 220 on that surface. In the illustrated embodiment, the graphics include pictorial representations of flowers and a text message which spells out the word "WELCOME". The present invention is not limited to any particular graphic within recess 210 and the present invention may include any of a variety of different forms of graphics.

Graphics 220 may be modified, and thus customized, by an individual after the floor mat has been purchased by the owner. The owner may customize the mat at their home or office and, thus, a graphic that may be appropriate for a particular situation may be modified by the individual for display in another situation. For example, the graphic may display a message stating "Happy Halloween" for Halloween and may be modified to display "Happy Holidays" during the winter holiday season. Thus, as can be understood, the graphics are modifiable by a user and thus, may be customized for the particular desires of a particular user.

As stated above, the present invention is not limited to any particular form for graphics 220. The graphics 220 can be customized by a user to include any of a variety of different colors, pictures, messages, or other representations that the user may want to display. In addition, the visible intensity of a color(s) can be modified. For example, a color that glows at night could be included in graphics 220 for an occasion such as Halloween.

Any of a variety of different types of structures or methods may be practiced in the present invention for modifying graphics 220 of floor mat 100 and the present invention is not limited to any particular methodology or structure for modifying graphics 220. Additionally, all of the various embodiments contemplated for providing a modifiable graphic display in the floor mat of the present invention can be incorporated in either, or both, of the

base portion or the insert portion. For example, the graphics may consist of pre-formed messages or art forms which may be adhered to either the surface which defines the bottom of recess 210, such as by using an adhesive or fastener assembly, e.g., a hook and loop assembly, or to the underside of insert portion 300 such that, when insert portion 300 is placed within base portion 200, the graphics would be visible through a transparent insert portion.

Alternatively, a variety of different graphics may be stored within floor mat 100 such that a user is able to selectively uncover a particular graphic for display while the other available graphics remain covered within floor mat 100. This type of selectability is known in other mediums where selectivity between a variety of different graphics within a common display panel is desired. For example, advertising bulletin boards at sporting events are able to selectively display a first particular message during a first particular period of time and display a second message during a second period of time on the same bulletin board.

A third possible alternative is to provide a modifiable display on the floor mat. The display surface can be associated with either the base portion or the insert portion, e.g., on either the bottom surface of recess 210 or attached to the bottom of insert portion 300. A display could be included on the front of the floor mat, on the back of the mat such that it is viewable through a transparent portion of the mat, embedded in the mat, attached to the mat, or integrally formed in the mat. For example, the display could be comprised of a small, thin box of graphics that could attach to a tacky portion and/or a base portion or any other component part of the floor mat. However it is associated with the floor mat, a user may design and display their customized graphic and may subsequently modify that graphic such that it is replaced with another graphic. A display surface such as an erasable writing board could be utilized for this purpose.

It is also contemplated that a modifiable electronic display surface could be provided, such as, for example, a liquid crystal display. The display could be connected to a computer and a computer generated image could be displayed on the display. Thus, the image displayed on the display could be

modified by generating a different computer image and displaying that computer image on the display. The display could be associated with base portion 200, such as included within recess 210, or could be included on a bottom surface, facing upward, of insert portion 300. Alternatively, the display could be integrally formed with either of the base portion or the insert portion. The modifiable display could utilize a plurality of different graphics that can be displayed in any of a variety of manners on the display. For example, the graphics could be displayed in a generally fixed position on the display or could scroll across the display, with both exemplary methodologies displaying multiple graphics either individually or in combination.

Other alternatives for modifying the graphics 220 of floor mat 100 include using light emitting polymers to create, and thus change, graphics 220. The light emitting polymers can be either applied to, attached to, or woven into the floor mat. The light emitting polymers may be utilized on any portion of floor mat 100, for example, on either the base portion or the insert portion, or on any other portion of the different embodiments for the floor mat. Light emitting polymers are known and described in U.S. Patents 5,945,502, 5,869,350, and 5,571,626, which are incorporated herein by reference in their entirety.

Other options for a display are to use electronic ink or electric paper. Electric paper is available from Xerox and is described in U.S. Patents 5,723,204, 5,604,027, 4,126,854, and 4,143,103, which are incorporated herein by reference in their entirety. Electric paper employs thousands of tiny, electrically charged beads, called Gyricon, each about the width of a human hair, to create pixels. The two-tone beads are embedded inside a liquid-filled plastic sheeting that forms the surface of the paper. Each bead, half-black, half-white, gyrates in response to an electric field. Whether the beads are black- or white-side up determines the image. Because there's no need to refresh the image, and because the screen isn't backlit, electric paper uses only a fraction of the power used by conventional electronic displays. Electromagnetic styluses and printer-like devices can be used for getting images onto the paper.

Electronic ink is available from E Ink Corp., at 45 Spinelli Pl., Cambridge, MA 02138. Electronic ink uses a microencapsulated micromechanical display system. Tiny microcapsules are captured between two sheets of plastic to create pixels. Alternatively, the capsules may be sprayed on a surface. The result is a flexible display material. The tiny capsules are transparent and contain a mixture of dark ink and white paint chips. An electric charge is passed through the capsules. Depending on the electrostatic charge, the paint chips float at the top or rest on the bottom of each capsule. When the paint chips float at the top, the surface appears white. When they rest at the bottom, and thus under the ink, the surface appears black. Each of the two states is stable: black or white. A transparent electromagnetic grid laid over the sheet's surface controls the shape of the image. The display may be wirelessly connected to, for example, a computer and thus, the World Wide Web by utilizing, for example, a Motorola paging system. Text on all displays, if multiple displays are used, can be changed at once by a single editor, through a Web page.

Again, a display, which could utilize any of the methods discussed above for modifying the display, could be associated with any portion of the floor mat, such as base portion 200 within recess 210 or on a bottom surface, facing upward, of insert portion 300. Alternatively, the display could be integrally formed with either of the base portion or the insert portion. The display could be utilized in any of the embodiments disclosed herein for the floor mat of the present invention, including a floor mat that includes a tacky surface and a non-tacky floor mat embodiment.

In further describing base portion 200, as mentioned above, base portion 200 may also include both a water dissipation component and a cushioning component. The water dissipation component provides for transferring moisture from the soles of a person's shoes that is standing on floor mat 100 to reduce the degree of moisture transferred to cleanable insert portion 300 and the cushioning component provides for conforming the floor mat 100 to the shape of the person's soles such that a greater amount of the debris on the person's soles may be removed by floor mat 100. The present

invention is not limited to any particular structure or material for the water dissipation component and the cushioning component. For example, the water dissipation component may be comprised of any of a wide variety of known materials, such as polyamides, vinylics, and polyisoprene. It is desirable, but not required, that the water dissipation component dissipate or move the water and not retain the water. Thus, porous materials, and not hydrophilic materials, are desired. The cushioning component may be comprised of any of a variety of cushioning components to include, for example, foam rubber.

Figure 2 also further illustrates cleanable insert portion 300. As can be seen, cleanable insert portion 300 has a geometric shape which is complementary in size and form to the recess 210 that is formed within base portion 200. As such, cleanable insert portion 300 is able to be received securely within recess 210. Thus, cleanable insert portion 300 has a length L_2 which is just slightly smaller than the length L_1 of recess 210. Likewise, cleanable insert portion 300 has a width W_2 which is also just slightly smaller than width W_1 of recess 210.

On the bottom side 310 of cleanable insert portion 300, i.e., that surface which contacts the surface which defines the bottom of recess 210, an attachment mechanism may be provided such that cleanable insert portion 300 may be removably attached to base portion 200 within recess 210. Any of a variety of different attachment mechanisms may be provided on the bottom surface of cleanable insert portion 300 to include, for example, a hook and loop fastener assembly or an adhesive. Regardless of the particular securement mechanism used to removably attach cleanable insert portion 300 to base portion 200, in this embodiment, cleanable insert portion 300 may be removed from base portion 200 such that it may be cleaned by a user and, after cleaning, be reinserted within recess 210 such that a clean surface is now provided for floor mat 100.

As stated above, cleanable insert portion 300 may be formed from a transparent material such as hydrophilic aliphatic acrylic polymers and copolymers incorporating acrylic acid, hydroxy ethyl methacrylate, and glycerin monomethacrylate. Forming cleanable insert portion 300 of a transparent

material would allow an individual to view the customized graphics that may be provided within floor mat 100, as discussed previously. Alternatively, the insert portion 300 could be opaque.

Additionally, the top side of cleanable insert portion 300 may include a tacky surface. The tacky surface would provide for assisting in removing debris from the soles of a person's shoes that is standing on cleanable insert portion 300. When the top tacky surface of cleanable insert portion 300 is dirtied to such an extent that the user desires to clean insert portion 300, in this embodiment, the user removes insert portion 300 from base portion 200 and cleans insert portion 300 to remove the accumulated debris. The insert portion 300 is then reinserted into base portion 200.

The tacky surface that is provided on the top side of cleanable insert portion 300 could be comprised of any of a variety of materials, such as polyvinyl chlorides combined with a suitable plasticizer, plasticized neoprene, polysulfides, and polyurethanes. Additionally, acrylics, such as butyl acrylate and many of its homologues, may be utilized. Again, the present invention is not limited to any particular material. The tacky surface may be formed, generally, from any adhesive material. The only consideration, in this embodiment, is that the surface should maintain its tacky characteristic even after repeated cleaning cycles.

The present invention is not limited to any particular methodology for cleaning insert portion 300. Insert portion 300 may be cleaned by any of a variety of methods depending upon a particular material composition for insert portion 300. For example, insert portion 300 may be cleaned by placing insert portion within a washing machine and washing insert portion 300 or insert portion 300 may be cleaned by scrubbing insert portion 300 with a scrub brush and soap and water or with a cleaning agent such as "Spic 'N Span".

Additionally, the insert portion 300 could be cleaned by utilizing a roller that also includes a tacky surface around the circumference of the roller. The tacky surface of the roller is comprised of a stronger adhesive than that of the tacky insert portion such that, as the tacky surface of the roller is rolled over the tacky surface of the insert portion, any dirt and debris on the tacky insert

portion will be drawn off of the tacky insert portion and will adhere to the roller. In this manner, a roller with a tacky surface could be utilized to clean the tacky insert portion.

Again, however, the present invention is not limited to any particular methodology or cleaning agent for cleaning insert portion 300 and any cleaning methodology or agent compatible with the composition of insert portion 300 is contemplated.

Floor mat 100 may also include additional features for assisting in the cleaning of the soles of a person standing on floor mat 100. For example, base portion 200 and/or insert portion 300 may include an antibacterial composition and an antifungal composition. Antibacterial compositions such as anthraquinone derivatives of polyethylene glycol mono- and di-methacrylate could be utilized. Thus, floor mat 100 would be bacteriacidal. The antibacterial feature would be particularly desirable because the floor mat would be able to both clean structural debris from the soles of the person's shoes and remove any potentially harmful bacteria from the person's soles as well.

Additionally, in order to further provide for a desirable sole surface prior to entering a particular area, floor mat 100 could also be provided with a fragrance. Flavones such as tricyclic molecules with aromatic substitution or organic ethers, e.g., limonoic acid, could be utilized. The fragrance is transferred from floor mat 100 to the soles of the person's shoes such that any undesirable odors are favorably masked by the fragrance.

The present invention is not only limited to utilizing an antibacterial composition, an antifungal composition, and/or a fragrance in floor mat 100. Rather, floor mat 100 could also incorporate a variety of other substances that would assist in cleaning the soles of a person's shoes.

Any variety of structures or methods could be utilized for associating an antibacterial composition, an antifungal composition, a fragrance, or any other composition, with floor mat 100. The substances could be applied as releasable, or dissipatable, coatings to floor mat 100 or could be releasably embedded as, for example, pellets within the structure of floor mat 100 such that as pressure is applied to floor mat 100 the substances are dispensed to

the soles of the person's shoes.

Figure 3 illustrates an alternative embodiment for floor mat 100. In Figure 3, it is illustrated that base portion 200 may include separate layers for a water dissipation component 230 and a cushioning component 240. Water dissipation component 230, in this embodiment, is disposed on a top side of the cushioning component 240. However, the present invention is not limited to this particular embodiment for water dissipation component 230 and cushioning component 240. For example, a single hybrid structure could be utilized for base portion 200 that would include the material properties to provide for both water dissipation and conforming structure.

Alternatively, Figure 4 illustrates that the floor mat may include both a water dissipation component, or wicking layer, and a water absorbtion layer. In Figure 4, floor mat 400 includes wicking layer 410 and water absorption layer 420. The wicking layer 410 could be comprised of polypropylene or olefins, or any other suitable material that has the properties of moving the water from the surface of floor mat 400. The water absorption layer 420 is disposed underneath the wicking layer 410 and absorbs any water that passes through the wicking layer 410. The water absorption layer 420 could be periodically removed and dried, such as by example only, in a drying machine. Of course, a wicking layer 410 may be used either with or without a water absorption layer 420 and a cushioning layer, as described previously in other embodiments, and the water absorption layer 420 could be used with or without a wicking layer 410 and a cushioning layer. Additionally, both the wicking layer and/or the absorption layer and/or the cushioning layer could be used with or without a tacky portion.

Returning to Figure 3, Figure 3 also illustrates an alternative embodiment for insert portion 300. Whereas the previously disclosed embodiment for insert portion 300 was discussed as a single structural member that could include a tacky surface on a top side thereof, the embodiment of Figure 3 for insert portion 300 is comprised of a plurality of layers. As can be seen, layers 301-305, comprise insert portion 300. Each of the layers may include a tacky surface on a top side thereof, as was described previously for

insert portion 300. In use, a top-most layer, e.g., layer 301, may be removed from its adjacent lower layer, e.g., layer 302, and may be independently cleaned. After cleaning, the layer may be reinstalled within recess 210 on top of the exposed layer of insert portion 300. In this manner, insert portion 300 may be cleaned by removing a top-most layer, cleaning that layer, and reinstalling that layer within recess 210. Whereas each layer is described as being independently cleanable, it is not required that each individual layer be cleanable. Each layer may be formed of materials as described previously when discussing the embodiment of Figures 1 and 2 for the insert portion.

Other alternative embodiments for insert portion 300 are contemplated. For example, whereas the previously disclosed embodiments discussed insert portion 300 as being comprised of one or more layers with a tacky surface on a top side of the layer(s), it is not required that insert portion 300 be formed with only a tacky surface on a top side thereof. More specifically, an alternative embodiment for insert portion 300 could include forming insert portion 300 as a single structural member from a material which is tacky in composition throughout the entire cross-section of the material. A material such as a blend of a noncross-linked hydrophilic thermoplastic, preferably a polyethylene glycol diacrylate with n not exceeding 15, and a hydrophobic material, such as a polyvinyl neoprene chloride, could be utilized for the insert portion of this embodiment. By forming insert portion 300 from a uniform, tacky material, the insert portion 300 does not necessarily have to be removed from recess 210 of base portion 200 to be cleaned. Insert portion 300 could be cleaned in this alternative embodiment by eroding the top surface of the insert portion as a result of use of the insert portion. Thus, by providing an erodible insert portion, the insert portion may be cleaned by the erosion of its top surface as the insert portion is used within floor mat 100.

As insert portion 300 erodes, the exposed surface of insert portion 300 continues to be tacky in composition because of its uniform cross-section. As the exposed tacky surface erodes, the dirt captured by the exposed tacky surface will dissipate as a result of the erosion and thus, the erosion of the insert portion itself provides for a cleanable insert portion.

Alternatively, even with a uniform cross-section of a tacky substance for insert portion 300, the user may remove insert portion 300 from recess 210 and separately clean insert portion 300. Thus, the user is not required to rely solely on the erodible characteristic of insert portion 300 for cleaning of insert portion 300; rather, the user may utilize the erodible cleaning feature of the insert portion in combination with a separate cleaning step of removing the insert portion from the base portion and independently cleaning the insert portion.

As discussed above, insert portion 300 may be comprised of a variety of materials, including materials such as tacky plastics, paper, or adhesives that can be cleanable and may or may not be erodible and reusable. If paper is utilized, the insert portion may be formed as a single structural member or as a plurality of layers, as discussed previously. Additionally, the paper may include a tacky surface on a top-side thereof. The paper may be translucent, opaque, or colored, and may include a graphic display thereon.

As discussed earlier, it is desirable, but not required, that the floor mat contain a water dissipation and/or absorption capability. This capability is desired to help prevent the tacky surface of the insert portion from becoming excessively wet and, thus, slippery. Whereas it has been discussed that, in order to help prevent a user from slipping on the tacky surface of the insert portion, a water dissipation and/or absorbing capability could be included in the floor mat to reduce the degree of moisture on the tacky surface, this is not the only structure contemplated for preventing the tacky insert portion from becoming slippery. Alternatively, the tacky insert portion itself could be formed to help prevent slipping. Figures 5-12 and 23-27 illustrate alternative embodiments for tacky insert portion 300. Figure 5 illustrates tacky insert portion 300 as including a grid pattern 320 of channels 322 that could be comprised of a non-tacky material. The channels could be either raised from the surface of insert portion 300 or could lie co-planar with the top surface of the insert portion. By forming the channels of a non-tacky material, even if the tacky material of insert portion 300 became wet, a user would be assisted in not slipping on the slippery, wet tacky surface of the insert portion by the

presence of the non-tacky surfaces which do not become slippery when wet.

Figures 6 and 7 illustrate another alternative embodiment for tacky insert portion 300 which includes anti-slip particles 324, e.g., silicon or sand particles, which extend above the top surface 330 of the tacky insert portion. It is desirable that the anti-slip particles be comprised of a material that does not become slippery when wet and that they be exposed from the tacky surface, however, it is not required. Even if the anti-slip particles are embedded within the tacky surface, their extension above the top surface 330 of the tacky insert portion will provide a physical frictional restraint against slipping for the soles of a person's shoes who is standing on the floor mat.

Whereas Figure 5 illustrates tacky insert portion 300 as including a grid pattern 320 of channels 322 that could be comprised of a non-tacky material and Figures 6 and 7 illustrate another alternative embodiment for tacky insert portion 300 which includes anti-slip particles 324 which extend above the top surface 330 of the tacky insert portion, it is not required that these two alternative embodiments contain features that are mutually exclusive. For example, it is contemplated that tacky insert portion 300 could include both a grid pattern of non-tacky channels and anti-slip particles, which is not illustrated specifically in the Figures but which can be easily understood.

Another alternative for providing a slip-resistant tacky portion is to include a plurality of anti-slip members, or treads or nipples, that extend up through and slightly above the surface of the tacky portion. As can be seen in Figure 8, in this embodiment, tacky portion 300 is inserted within a base portion, which may be a water absorbent border 500, and includes a plurality of apertures 342 within it. Each of a plurality of treads 344, which may extend upward from a base disposed underneath tacky portion 300, extend up through one of the plurality of apertures 342. A top-most end of each tread extends above a top-most surface 340 of tacky portion 300. As a person steps onto tacky portion 300, the quantity and positioning of the treads 344 is such that the tacky portion is able to remove debris from the person's shoes and the treads 344, at least one of which is stepped upon by the person, prevents slipping of the person on the tacky portion 300 should the tacky portion 300 become

slippery when wet. The treads 344 may compress when stepped upon such that the top-most end of the tread is co-planar with the top-most surface 340 of the tacky portion 300. In this manner, the tread will contact the person's shoes to prevent slipping but yet not hinder contact between the person's shoes and the tacky surface of the mat, which enhances the cleaning of the person's shoes. Therefore, there is a relationship between the distance that the tread extends above the top-most surface of the tacky portion and the compressibility of the tread; a relationship which provides the functionality discussed above.

The treads may be configured in any shape and size. Additionally, the treads may be comprised of any material which is slip-resistant when wet, such as, for example, rubber or plastics. The treads may include grooves within them to further assist in preventing a person from slipping on the tacky portion.

Figures 9 and 10 illustrate additional alternative embodiments for both the tacky insert portion 300 and the base portion 200 that help to prevent slipping on a potentially wet tacky portion. As can be seen in Figure 9, and as discussed previously, tacky insert portion 300 is comprised of a plurality of layers 301, 302, and 303. Whereas only three layers are illustrated, it can be understood that any number of layers can be utilized in the present invention. As can be seen, tacky layers 301-303 each contain a plurality of integrally formed raised portions 300A. These raised portions can help to prevent a person from slipping on the tacky portion by providing increased friction between the top surface of the tacky layer, due to the raised portions, and the person's shoes. Thus, these raised portions can substantially reduce the potential for slipping on the tacky portion if it becomes wet.

The raised portion 300A can be formed in each layer in a variety of ways and the present invention is not limited to any particular method. One method for forming the raised portions is to assemble the layers into a pad of layers and then insert the entire pad into a machine press. One face of the press is flat and the other face, i.e., that face that is facing the non-tacky, or underside, of the layers, contains an array of bosses or bumps. When the pad

is pressed in the machine press, all of the tacky layers become embossed with the pattern on the press face, causing the raised portions, or embossed portions, in each tacky layer of the pad. Thus, each embossed portion is integrally formed in each layer and is comprised of an indentation on the underside, or non-tacky side, of each layer and a raised portion on the upperside, or tacky side, of each layer.

As can be understood, in the method as described above for forming the raised portions, the raised portions of each layer are aligned with the raised portions of each other layer. It is desirable, but not required, that the raised portions of each layer are aligned so that their shape may be easily maintained when the layers are stacked one upon another.

As can be seen in Figure 10, base portion 200 may also be formed to be complementary to the embossed layers. The surface 200A that defines a bottom of the recess of base portion 200, which receives within it the tacky layers 300, can be formed with raised portions 200B. These raised portions are positioned so that they are aligned with the raised portions in the tacky layers. Thus, the raised portions 200B on surface 200A are positioned within the indentations in the lower-most tacky layer when the layers are inserted into the recess in the base portion. As can be understood, these raised portions help to retain and maintain the raised portions in the tacky layer(s), particularly when only the lower-most layer(s) remain in the floor mat. However, it is not required that the base portion be formed with raised portions in practicing the present invention. The layers may be formed with raised portions whether or not the base portion includes complementary raised portions.

In another alternative embodiment for a tacky portion, the tacky portion could also include a water dissipating capability. The tacky portion could be comprised of a hydrophobic porous structure which would assist in dissipating water from the surface of the tacky portion.

Figures 11 and 12 illustrate alternative embodiments for the floor mat of the present invention that provide a water dissipating capability for the tacky portion. As will be discussed, the embodiment of Figure 11 also helps to prevent a person from slipping on a potentially wet tacky portion.

Figure 11 illustrates an embodiment for tacky portion 300 where the tacky layers 301 and 302 of the tacky portion define a plurality of apertures 300C therein. The apertures of each layer are aligned with the apertures of each other layer. Thus, because of the aligned apertures in the layers, the tacky portion is able to drain surface water from the top-most surface of the tacky portion, or from the soles of a person's shoes that is standing on the tacky portion, through the apertures and to the base portion, within which the layers may be positioned. The base portion, as discussed previously, may include a water dissipation component and/or a water absorbing component which would move and/or absorb the surface water drained from the tacky portion through the apertures.

The apertures would also provide for helping to prevent slipping on a wet surface of the layers, not only by draining surface water from the surface, but by also providing for enhanced frictional contact between the shoes of the person stepping on the layer and the layer itself. The apertures provide for discontinuities in the surface of the layer which would enhance the frictional contact between the person's shoes and the layer. The edges of the surface of the layer which define the apertures would provide for this enhanced contact. The person's shoes would engage with the edges, thus enhancing frictional contact for the shoes. Additionally, the apertures would act as a suction on the bottoms of the person's shoes, e.g., like suction cups. This suction caused by the apertures on the person's shoes would also help to prevent slippage on the surface of the layer.

Figure 12 illustrates another embodiment for the floor mat of the present invention that also provides a water dissipating capability for the tacky portion. As can be seen, tacky portion 300 includes layers 301 and 302. Base portion 200 defines a recess where layers 301 and 302 are disposed within the recess. A surface of the base portion that defines a bottom of the recess includes a raised portion 200C at or near a center position within the recess. Thus, the raised portion 200C of the base portion forms a raised portion in each of the layers. As can be understood, the raised portion formed in the layers acts to dissipate surface water on the layers from the layers. The

surface water will drain off of the layers under the force of gravity due to the raised portion.

Again, any number of layers may be included in tacky portion 300 in the embodiments of Figures 11 and 12.

It is also contemplated that a water absorbing powder, such as a talcum powder, could be provided in the present invention. The powder could either be integrated into the floor mat or be separately associated with the floor mat. The talcum powder would remove moisture from the soles of a person's shoes when the person stepped into the powder and the tacky insert portion could then remove the powder from the person's soles, in addition to any dirt on the soles, when the person next steps on the tacky insert portion.

The present invention also provides an apparatus and method for determining when the tacky portion, or a layer in the tacky portion, should be removed for cleaning. Since the tacky portion assists in removing dirt from the soles of the person's shoes that steps on the tacky portion, the tacky portion, or a layer thereof, will become dirty after some number of persons step on the it, assuming that any particular person's shoes are not exceptionally dirty. Therefore, it would be desirable to assist a person in deciding when to remove a dirty tacky portion for cleaning. Again, as discussed above, this determination can be made after a certain number of persons step on the mat. Thus, an embodiment of the present invention as illustrated in Figure 13 includes a sensor system 700 that detects the presence of a person on the floor mat 100. The sensor system 700 may detect the presence of a person on base portion 200 and/or tacky portion 300. Since it is assumed that a person who steps on base portion 200 will also step on tacky portion 300, sensing the person's presence on either portion is sufficient for practicing the present invention.

Sensor system 700 includes a sensor 710 and a display device 720, e.g., an LED, coupled to sensor 710 and disposed on mat 100 such that it can be viewed. A power source, such as a battery, may be included on an underside of the floor mat. As mentioned above, sensor 710 senses the presence of a person on mat 100, e.g., in this embodiment on tacky portion

300. The sensor can detect the person's presence by utilizing any of a variety of apparatuses and methods and can include sensing the pressure applied to the mat by the weight of the person standing on the mat or by sensing the motion across the surface of the mat by the movements of the person. Thus, pressure sensors and motion detectors may be utilized in the present invention. Sensor system 700 also determines the number of persons that have stepped on the mat 100 by counting the number of sensed presences. After the number of presences equals a defined number of presences, a signal is provided to display device 720, e.g., illuminating the LED, which indicates that the tacky portion should be removed for cleaning. The present invention is not limited to removing the tacky portion at any particular number of sensed presences and the number may be adjusted based on the particular environmental conditions in which the mat is utilized. Of course, as can be understood, after the dirty tacky portion or layer is removed and/or cleaned the sensor system can be reset to begin counting the total number of presences on the newly cleaned or exposed layer.

Alarm device 720 can provide either a visual, audible, or vibratory signal and the present invention is not limited to providing any particular type of signal. For example, a visual signal could consist of a light that is illuminated when the floor mat should be cleaned and that is not illuminated when the floor mat does not require cleaning. Alternatively, the light could be continuously illuminated in one of a plurality of different colors, with each color signifying a different state of cleanliness for the floor mat. For example, a green light could signify that the mat does not need cleaning. A yellow light could indicate the mat is reaching a state of dirtiness that will soon require cleaning. A red light, which could blink on and off, could signify that it is time to clean the floor mat.

The sensor system of the present invention may be utilized with any of the embodiments disclosed for the cleanable portion, which may or may not be an insert and may or may not include layers and a tacky surface(s), and the base portion.

Whereas cleanable portion 300 has been discussed as an insert portion, it is not required that cleanable portion 300 be inserted into floor mat

100. There exists many alternative possibilities for associating cleanable portion 300 with floor mat 100. For example, cleanable portion 300 could be placed on top of base portion 200 or could be positioned adjacent to base portion 200. The present invention is not limited to inserting any of the embodiments for cleanable portion 300 within base portion 200.

For example, Figure 14 illustrates a tacky portion 300 and a non-tacky portion 200, which may include a water dissipation component, a water absorbing component, and a cushioning component, as discussed previously, that are separable. As can be seen in Figure 14, tacky portion 300 may be bordered within a border 500, which may be water absorbent, water dissipative, and include a cushioning component, and may include a plurality of apertures 342 and treads 344 within it. Tacky portion 300 can include any of the embodiments previously discussed. An attachment layer 600 is positioned on an underside of both border 500 of tacky portion 300 and non-tacky portion 200. The border 500 and/or non-tacky portion 200 may be releasably attached to attachment layer 600. Thus, through attachment layer 600, border 500, and therefore tacky portion 300, and non-tacky portion 200 are releasably attachable to each other. In this manner, it is possible to, for example, position non-tacky portion 200 outside of a person's home on the front porch and tacky portion 300 within the person's home.

Attachment layer 600 can be any of a variety of materials. All that is required is that the attachment layer be able to releasable join one portion of the floor mat to a second portion of the floor mat. For example, a hook and loop fastener assembly, e.g., Velcro®, can be used with one portion of the assembly on the attachment layer and the other portion on the underside of the first portion of the floor mat and the second portion of the floor mat. Alternatively, an adhesive can be utilized to releasably join the two portions of the floor mat to the attachment layer. Additionally, snaps, including any type of male/female connector, may be used to join the two portions to the attachment layer.

Figure 15 illustrates a first process step in utilizing an embodiment of the floor mat 100 of the present invention. As was described previously, an

embodiment of floor mat 100 includes a base portion 200 and an insert portion 300. As can be seen in Figure 15, and as was also discussed previously, a different graphic display 220 is present in the embodiment of Figure 15 than was illustrated in the embodiment of Figures 1 and 2. Thus, Figure 15 displays a "Hello" message with "smiley face" representations in the graphic 220.

As can be seen in Figure 15, in utilizing an embodiment of the present invention, a user would first step upon base portion 200. As discussed earlier, base portion 200 may include a water dissipating and/or absorbing component and is thus able to assist in removing any moisture from the soles of the person's shoes. As was also discussed earlier, because base portion 200, in one embodiment, also includes a cushioning component, base portion 200 conforms to the person's soles when the person steps upon base portion 200. Whereas not illustrated in Figure 15, as discussed previously, an antibacterial composition, an antifungal composition, a fragrance, or any other cleaning substance may also be associated with floor mat 100 and applied to the soles of the person's shoes when the person applies pressure to floor mat 100.

As can be seen in Figure 16, the second process step in utilizing the present invention includes the person stepping onto insert portion 300 of floor mat 100. As discussed previously, insert portion 300 may include a tacky surface on a top side thereof for assisting in removing debris from the soles of the person's shoes. Additionally, antibacterial compositions, antifungal compositions, fragrances, or other cleaning compositions may also be included within insert portion 300 for dispensing to the soles of the person's shoes.

After the person steps onto insert portion 300, the user then steps off of floor mat 100. As described previously, floor mat 100 may be cleaned after an accumulation of dirt on insert portion 300 by any of the methods described previously. Insert portion 300 may be removed from base portion 200 and cleaned, a layer may be removed from insert portion 300 to be cleaned or discarded, or insert portion 300 may be cleaned through erosion of insert portion 300. The present invention is not limited to any particular methodology for cleaning insert portion 300 of floor mat 100.

Figures 17-22 illustrate further alternative embodiments for the floor mat of the present invention. As can be seen in Figure 17, in this embodiment for the floor mat, floor mat 1700 includes a cleanable portion 1710 and a plurality of base portions 1720A-D. As can be seen, cleanable portion 1710 is positioned within one of base portions 1720A-D. In this manner, the floor mat 1700 can be customized for a particular user by interchanging the cleanable portion 1710 with one of a variety of base portions 1720A-D. The base portions 1720A-D can be formed in any of a variety of physical configurations and can include any of a variety of themes, graphics, or colors. Thus, a common cleanable portion 1710 may be utilized with a variety of base portions 1720A-D.

Figures 18-20 illustrate another alternative embodiment for a floor mat 1800 in accordance with the principles of the present invention. As can be seen in Figure 18, floor mat 1800 also includes a cleanable portion 1810 and a base portion 1820. As discussed previously, cleanable portion 1810 is received within base portion 1820. In this embodiment, cleanable portion 1810 is comprised of a single sheet 1810A. The single sheet 1810A may be tacky on a top-side thereof and may include apertures therein to receive anti-slip nipples though it, as was also discussed previously. The single sheet 1810A, in this embodiment, may be removed and replaced with another sheet when dirty.

Figure 19 illustrates that a plurality of sheets 1810B-D, may be attached to each other and rolled into a roll 1830 of sheets. The sheets can be joined to each other at a perforated joint to provide for ease in separating a sheet from the roll of sheets. As can be understood, a sheet may be separated from the roll of remaining sheets and may be then inserted into base portion 1820.

Figure 20 illustrates that the roll of sheets 1830 may be stored in a storage device 1840, such as, for example, by mounting the roll of sheets 1830 on a cabinet door, which may be located in proximity to the floor mat. In this manner, replacements sheets are easily organized and stored for use.

Alternatively, instead of organizing the sheets in a roll and storing the

roll in a cabinet, the sheets could be folder one upon another such that they form a flat package. The package of sheets could then be stored underneath of the floor mat 1800 where individual sheets could be removed from the package and from under the floor mat, when needed, similar to the way a Kleenex® tissue is dispensed.

Figure 21 illustrates another alternative embodiment for a floor mat in accordance with the present invention. Floor mat 2100 also includes a cleanable/scrapable portion 2110 and a base portion 2120. In this embodiment, cleanable portion 2110 is formed, as discussed previously in this application, as a single structural member from a material which is tacky in composition throughout the entire cross-section of the material. As was also discussed previously, by forming portion 2110 from a uniform, tacky material, the portion 2110 does not necessarily have to be removed from the base portion 2120 to be cleaned. However, in the embodiment previously discussed, the cleanable portion 2110 could be cleaned by eroding the top surface of the insert portion as a result of use of the insert portion. In the embodiment of Figure 21, the cleanable portion is cleaned by scraping off a top surface of approximately 2-3 microns from the cleanable portion 2110 by utilizing a scraper 2130.

Scraper 2130 can include any of a variety of structures, however, all that is required is that the scraper be capable of removing a top surface from cleanable portion 2110. For example, any type of scraping surface can be utilized in scraper 2130, such as, for example, a dull knife, a razor, or a plane.

Scraper 2130 is movable on tracks 2140, 2145. Tracks 2140, 2145 are adjacent to cleanable portion 2110 and base portion 2120. Scraper 2130 may include wheels or other structures, e.g., pins, which are received within complementary structures, e.g., grooves, in tracks 2140, 2145. Thus, scraper 2130 is movable across cleanable portion 2110 on tracks 2140, 2145. The scraper 2130 may only include a scraping surface on the portion of scraper 2130 that is movable across cleanable portion 2110. Additionally, it is not required that two tracks be utilized. The scraper could be movable within a single track.

Scraper 2130 may be moved by any of a variety of methods, including using the foot of a user to engage with the scraper to move the scraper on the tracks.

Floor mat 2100 also includes a catch basin 2150 that may be included at one or both ends of tracks 2140, 2145. Catch basin(s) 2150 includes a recess into which is deposited the shavings from cleanable portion 2110 after scraper 2130 scrapes the cleanable portion. Scraper 2130 moves the shavings off of the cleanable portion and into the catch basin 2150. The shavings from the cleanable portion deposited into the catch basin may be removed from the catch basin in any of a variety of ways, including, for example, by vacuuming the shavings from the catch basin or removing a detachable catch basin, throwing away the contents from the catch basin, and reinstalling the catch basin.

As can be understood, as the cleanable portion is shaved, the scraper is commensurately lowered on tracks 2140, 2145 such that the surface of the scraper that engages with the cleanable portion remains engaged with the cleanable portion. As such, for example, the scraper may be mounted on a ratchet mechanism such that, as the scraper is moved across a complete width of the floor mat, the scraper actuates the ratchet such that the ratchet lowers the scraper. Alternatively, the scraper could remain in the same relative position with respect to the tracks and the tracks could be ratcheted lower with respect to the base portion and cleanable portion. Additionally, the blade surface of the scraper could be lowered with respect to the scraper's structure such that the blade is moved relative to the cleanable portion and the base portion but the scraper remains in the same relative position with respect to the tracks and the cleanable portion and the base portion.

Additionally, it is not required that a base portion be utilized in the embodiment for floor mat 2100. The cleanable portion alone can be utilized with the tracks adjacent the cleanable portion and the scraper movable on the tracks. A catch basin(s) could still be utilized. As such, Figure 22 illustrates an embodiment for floor mat 2200 that includes a cleanable portion 2210 without use of a base portion. Cleanable portion 2210 is adjacent to tracks 2240,

2245. Scraper 2230 is movable on tracks 2240, 2245. A catch basin 2250 may be included at one or both ends of tracks 2240, 2245.

As discussed above, there is no known single chemistry which provides a tacky surface which is tacky both when wet and when dry, and yet not too tacky under either condition. Accordingly, in still further alternative embodiments of the present invention, a dual chemistry may be used for the tacky surface. The dual chemistry combines adhesive compositions of two different types. Adhesive compositions of one type are optimally adhesive when dry. Adhesive compositions of the other type are optimally adhesive when wet. In combination, the adhesive compositions of the two types can be used to provide a top exposed surface that is optimally tacky both when wet and when dry. Thus, when a person's shoe comes in contact with the top exposed surface, the surface provides good tackiness when the surface is either dry or wet, and helps to prevent the person from slipping when the surface is wet.

By "optimally tacky" as used in the foregoing, it is meant that, while either of the two types of adhesive compositions may retain some tackiness when either dry or wet, one type has a best or serviceable level of tackiness under dry conditions, while the other type has a best or serviceable level of tackiness under wet conditions.

A material that comprises the two types of adhesive compositions and presents the top exposed tacky surface that comes in contact with a shoe could assume a variety of embodiments. For example, the dual-chemistry top exposed tacky surface could be the surface of a tacky "insert" or "portion," such as insert 300 described in the foregoing, designed to cooperate with a non-tacky base portion.

On the other hand, the dual-chemistry top exposed tacky surface might not be a surface of a tacky "insert" or "portion" as such. Rather, the dual-chemistry top exposed tacky surface could be the substantially the entirety of the usable surface of an independent floor mat.

Whether the dual-chemistry tacky surface is used in combination with a non-tacky portion, or whether it is substantially the entirety of the usable

surface of an independent floor mat, a separate structural member for an anti-slip component does not need to be used in conjunction with the tacky surface to prevent slipping on the tacky surface when the tacky surface becomes wet. On the other hand, if desired, a separate structural member for an anti-slip component could be used with the tacky surface.

Generally, the material that presents the tacky surface comprises a combination of components having chemistries that respectively are optimally tacky when dry or optimally tacky when wet, such that the combination as a whole presents a top exposed tacky surface that retains a serviceable level of tackiness when either wet or dry. More particularly, when the tackiness of components having a chemistry which is optimally tacky when dry is reduced due to the presence of moisture, the loss of tackiness is compensated for by the components having a chemistry which is optimally tacky when wet. On the other hand, when the tackiness of components having a chemistry which is optimally tacky when wet is reduced due to the absence of moisture, the loss of tackiness is compensated for by the components having a chemistry which is optimally tacky when dry

The components could be combined in a pattern of alternating regions with tacky-when-dry properties and tacky-when-wet properties, respectively. The components could be combined such that the composite material is segmented into regions with distinct characteristics such that the material has a substantially non-uniform composition. On the other hand, the components could be combined with a fine granularity, such that the material has a substantially uniform composition.

Fig. 23 illustrates one possible embodiment of a multi-layer assembly 10 including a material that presents a top exposed tacky surface that is tacky when either wet or dry. The layers include a top layer 11, which comprises a material that presents a top exposed tacky surface that is tacky both when wet and when dry. The material comprises at least three types of distinct "domains." A "domain," with respect to a composition of the top layer 11, refers to a discrete constituent segment of the top layer with chemical properties distinct from other discrete constituent segments.

The domains in top layer 11 include a tacky domain with pressure-sensitive adhesive characteristics and high surface energy. This tacky domain could comprise, for example, copolymers of alkyl methacrylates and difunctional co-monomers such as acrylamides, epoxy acrylates, or urethane terminated acrylates and pressure-sensitive polysiloxane derivatives.

A second domain of the top layer 11 is a non-tacky hydrophobic domain of low surface energy. This non-tacky hydrophobic domain could comprise, for example, polyalkyl fluroacrylates, acrylic terminated fluoroacrylamides, or fluorosulfonamides, polysiloxanes derivatized with one or two acrylate groups, celluloses derivatized with acrylates, styrene butadiene copolymers or acyclic acrylates or methacrylates. The methacrylates could include, for example, cyclohexane methacrylate, norbornene methacrylate, or isobornyl methacrylate.

A third domain of the top layer 11 is a hydrophilic domain. The hydrophilic domain could comprise, for example, hydroxyethyl methacrylate, polyacrylic and methacrylic acids and their salts, polyvinyl alcohol, polyoxymethylenes, polyamides, polyesters and polyimides of unsaturated dicarboxylic acids.

In the top layer 11, tacky domains could be cross-linked, and hydrophilic domains could be cross-linked, with a cross-link density, respectively, ranging from 5-20 mole per cent. The material of the top layer is either in an elastomeric or a leathery state in a range of temperatures in which the floor mat would be in service. A desired range of glass transition temperatures is 5-25 °C.

In the top layer 11, a plurality of tacky domains are interspersed with a plurality of hydrophilic domains. The hydrophilic domains modulate the overall tackiness of the top layer 11, by causing a tackiness of the top layer 11 in a dry state to be substantially equal to a tackiness of the top layer 11 in a wet state.

A function of the hydrophobic domains of low surface energy is to prevent the formation of a continuous film of water over the top layer, and therefore increase the rate of drainage. The hydrophobic domains also

enhance the pressure dependency of the tackiness of the top layer, thereby reducing tackiness in the absence of a force. This can help to prevent excessive tackiness when pressure is applied as the floor mat is actually being used, and to prevent the tacky surface collecting an excessive amount of airborne particulate matter.

The overall morphology of polymeric layer 11 is miceller, with the hydrophobic domains being substantially at or near the surface of the layer, and the hydrophilic and tacky domains being substantially below the surface of the layer. The hydrophilic and the tacky domains migrate to the surface under wet conditions, and together, provide the tackiness needed to attract dirt, bacteria and the like from footwear or other surface to be cleaned, and to help prevent slipping on the tacky surface when it is wet.

In fabricating the top layer 11, domain formation can be enhanced through the use of solvent-induced crystallization. Depending upon the chosen method of manufacturing or assembly of the tacky portion, further enhancements may be possible through selective orientation of the domains during the extrusion, laminating or application process of the top layer 11.

In addition to a top layer 11 as described above, the multi-layer assembly 10 could also include at least one hydrophobic layer 12. On one side thereof, the hydrophobic layer 12 could be adjacent to the top layer 11. The hydrophobic layer 12 could be made of a hydrophobic copolymer. Examples of such a hydrophobic copolymer include methyl methacrylate copolymers, a styrene butadiene co-polymer, and polyalkyl or polyaryl siloxanes. The hydrophobic layer 12 could be bonded to the top layer 11 by means of, for example, an acrylic adhesive. The glass transition temperature of the hydrophobic layer may be in the range 5-150 °C.

The hydrophobic layer 12 is designed to efficiently transport water from the top layer 11. The composition of the hydrophobic layer 12 is selected to minimize solubility of water and maximize its diffusivity in the hydrophobic layer 12. Polysiloxanes as constituents of the hydrophobic layer 12 are especially desirable from this point of view. It is also important to minimize the swelling characteristics of the hydrophobic layer 12 in the presence of water,

because the desired function of this layer is to promote drainage and remain relatively dry.

On a side opposite the side adjacent to the top layer 11, the hydrophobic layer 12 may be adjacent to a hydrophilic layer 13 made of polyvinyl alcohol, polyoxymethylenes, polyhydroxy esters or amides. The cross-link density of this hydrophilic layer 13 could be between 10-30 mole per cent, and its glass transition temperature could be in the range –30 °C to 10 °C.

The hydrophilic layer 13 is capable of absorbing water transported to it by the hydrophobic layer 12. The hydrophilic layer 13 may be adhesively bonded to adjacent layers. Absorption of water by the hydrophilic layer increases its thickness. The composition and cross-link density of the hydrophilic layer may be selected so that this layer can hold up to twice its weight in water (swelling ratio 200%). A function of the hydrophilic layer is to act as a reservoir of water, when removal of water through evaporation is slow. At the same time, the cross-link density and functionality of the hydrophilic layer is carefully controlled so that it does not unduly retain moisture.

The multi-layer assembly 10 could further include a bottom layer 14 for contact with a floor. The bottom layer 14 could be made of a wear-resistant, anti-skid polymer such as a polyurethane, a styrene butadiene copolymer, or a polycarbonate. Other materials suitable for forming the bottom layer 14 include acrylic terminated aromatic polyurethanes and epoxides. The bottom layer 14 could generally be cross-linked highly (e.g., 10-50 mole per cent), and its glass transition temperature, when measurable, could be below 5 °C and in any case below 10C. The bottom layer 14 could be formed so as to have a high surface energy, so that it does not lose all affinity to a floor surface even in the presence of a film of water on the floor surface.

The bottom layer 14 could be especially useful if the multi-layer assembly 10 were being used as an independent floor mat. On the other hand, if the multi-layer assembly 10 were being used as an insert in combination with a non-tacky portion, the bottom layer 14 might not be present. Instead, an adhesive might be used on a surface of hydrophilic layer 13 for contacting the

non-tacky portion, to ensure adhesion of the multi-layor assembly 10 to the non-tacky portion.

The top layer 11 could be about 50-500 microns in thickness. The hydrophobic layer 12 could be about 100-1000 microns in thickness, and the hydrophilic layer 13 could be about 250-1500 microns in thickness. The bottom layer 14 could be approximately 250-1000 microns in thickness.

The multi-layer assembly 10 could be embossed with a pattern to increase surface area, and could be perforated with a pattern of holes (2-10 mm in diameter) to provide drainage.

A multi-layer assembly 10 could be assembled by manufacturing each of the above-described layers separately, and then bonding them together using conventional processes. Alternatively, for example, the top layer 11 could be fabricated first, and then the other layers could be successively applied or bonded to the top layer 11 and to each other.

According to other alternative embodiments, the top layer 11 could comprise a material having a uniform composition. By uniform composition, it is meant that the material is not divided into domains, but instead is more finely grained such that the material has chemical properties that are substantially constant throughout the material. The chemical properties are such that the material can absorb water while retaining tackiness.

For example, the material of uniform composition in top layer 11 could be made of polymers, such as block copolymers or a grafted copolymer. The polymers could be pressure-sensitive adhesives coated or grafted with hydrophilic monomers followed by a further grafting of a fluoroacrylate. Alternatively, the material of uniform composition could comprise a mixture of pressure-sensitive adhesives with hydrophilic fillers such as fibers or microspheres to bind water.

As noted above, the multi-layer assembly could be perforated for improved water drainage. Figure 24 illustrates one embodiment of a perforation pattern formed in a multi-layer assembly 15 comprising four layers as described above. Circular holes 16 are punched, cut, or drilled through all four layers. While circular holes are shown by way of example, the holes could be of any

arbitrary shape.

Additional embodiments of the present invention could utilize two fundamentally different adhesive compositions arranged in some arbitrary pattern.. A first adhesive composition could be pressure-sensitive and tacky when dry. A second adhesive composition could be hydrophilic and tacky when wet. The pattern could be a pattern of regions of the first adhesive composition alternating with the second adhesive composition. Examples of tacky-when-dry adhesives include poly(ethylene-co-vinylacatate) and polyvinylbutyral. Examples of tacky-when-wet adhesives include mixtures containing natural and synthetic rubbers in the presence of plasticizers mixed with hydrocolloid gums and the following class of chemistries: co-polymers of two amino ethyl ethacrylate and nbutly methacrylate.

Figure 25 illustrates a perspective view of a cross section of a multi-layer assembly 17 utilizing two fundamentally different adhesive compositions as described above. A top layer 18 comprises a checkerboard pattern 19 of tacky-when-wet adhesives alternating with tacky-when-dry adhesives. The checkerboard pattern is shown only by way of example and other alternating patterns are contemplated in the present invention. A bottom layer 20 is a wear-resistant anti-skid layer for contacting a floor. The bottom layer 20 could be especially useful if the multi-layer assembly 17 were being used as an independent floor mat. On the other hand, if the multi-layer assembly 17 were being used as an insert in combination with a non-tacky portion, the bottom layer 20 might not be present. Instead, an adhesive might be used on a surface of layer 18 for contacting the non-tacky portion.

Figure 26 is perspective view of a cross section of a multi-layer assembly 21 illustrating yet another embodiment of the present invention. A top layer 22 comprises a tacky-when-dry adhesive. A second layer 23 comprises a hydrophilic tacky-when- wet adhesive. A bottom layer 24 is a wear-resistant anti-skid layer for contacting a floor.

Holes 25 are formed in the top layer 22 to enable contact by the sole of a shoe or other surface to be cleaned with the tacky-when-wet adhesive at the same time that the tacky-when-dry adhesive is contacted. Since the

second layer 23 is also hydrophilic, it will swell and fill the holes 25 when wet, providing greater access to the tacky-when-wet adhesive of layer 23 by a surface to be cleaned, such as the sole of a shoe.

Fig. 27 illustrates another embodiment wherein the material that presents the top exposed tacky surface has a substantially uniform composition. The material comprises a blend of materials that are tacky when dry with materials that are tacky when wet. The tacky-when-wet materials include certain hydrocolloid gums (e.g., gaur gum, locust bean gum, and the like). Since these hydrocolloid gums have a large capacity for absorbing moisture, they should provide good wet adhesive or tackiness. The tacky-when-dry materials, which are also pressure-sensitive, could include synthetic and/or natural rubbers in the presence of plasticizers. The synthetic and/or natural rubbers could be, for example, polyisobutylenes, natural rubber, silicone rubbers, acrylonitrile rubbers, polyurethane rubbers, butyl rubber elastomer, and the like.

The strength and uniformity of a blend of tacky-when-wet and tacky-when-dry materials as described above could be increased by the introduction of a cohesive strengthening agent to the blend. The cohesive strengthening agent could, for example, be one or more of natural and artificial fibrous materials such as wood cellulose, cotton, or Dacron.

In Fig. 27, a top layer 27 of a multi-layer assembly 26 comprises a blend of pressure-sensitive dry adhesive with a hydrocolloid gum, mixed with a cohesive strengthening agent. Due to the cohesive strengthening agent, a surface 28 of the top layer 27 has a uniform appearance of a single material. A bottom layer 29 is a wear-resistant anti-skid layer for contacting a floor. The bottom layer 29 might not be present if the layer 27 is being used as an insert.

Any of the materials that present a top exposed tacky surface that is tacky both when wet and when dry as described above could be used in combination with each other, or in combination with any of the other layers described. For example, either of layers 18 or 27 could be used in combination with a hydrophobic layer and a hydrophilic layer.

As described previously, in an embodiment, the floor mat includes

a tacky surface having a top exposed surface with a surface area and a substantially non-paper anti-slip component disposed within the surface area of the top exposed surface of the tacky surface to prevent slipping on the tacky surface when wet. Thus, the anti-slip component is in operable association with the top exposed surface of the tacky surface to reduce slippage of a person on the top exposed surface who steps on the top exposed surface when the top exposed surface is wet. The anti-slip component may be integrally included in the top exposed surface.

The anti-slip component may include a plurality of channels as can be seen in Figure 5 which are comprised of a non-tacky material where the plurality of channels is extendible from the top surface of the tacky surface in response to a person stepping on the tacky surface. Alternatively, the floor mat may include an anti-slip component that is extendible from the top surface of the tacky surface in the absence of a person standing on the tacky surface, such as the treads described previously. Thus, the treads may be elongated members that have a length extending across the top exposed surface of the tacky surface which is substantially greater than a height that the treads extend above the top exposed surface of the tacky surface.

Additionally, the anti-slip component may be the apertures illustrated in Figure 11.

The various embodiments for an anti-slip component may be comprised of a non-tacky material, e.g., non-tacky members, and a water resistant material. Thus, the anti-slip components may be water resistant. The anti-slip components may also be comprised of a material such that they remain functional to prevent slipping on the tacky surface after a plurality of uses. As such, the anti-slip component may be comprised of a sufficiently rigid material such that a configuration of the anti-slip component is substantially maintained after being stepped on a plurality of times by a person and may be comprised of a material having a composition which is substantially maintained after having been stepped on a plurality of times by the person.

As was also described previously, in an embodiment, the floor mat includes a base portion having a non-tacky exposed top surface area 250 for

contacting the soles of a person's shoes thereon and a tacky portion associated with the non-tacky exposed top surface area of the base portion and having a tacky exposed top surface area 350 for contacting the soles of the shoes thereon. As can be seen at least in Figure 1, the base portion non-tacky exposed top surface area 250 is at least as large as the tacky portion tacky exposed top surface area 350.

The floor mat's base portion may include a cushioning component such that when the person's shoes applies pressure to the base portion and the tacky portion, both the base portion and the tacky portion conform to a topography of a bottom of the person's shoes. The tacky portion may also include a tacky surface on a bottom side of the tacky portion.

In various embodiments, the base portion may circumscribe the tacky portion, as can be seen in Figure 1, or may be located adjacent to the tacky portion, as can be seen in Figure 14.

As can also be seen in at least Figure 1, the floor mat has a base portion that has a continuous non-tacky exposed top surface area 250 for contacting the soles of a person's shoes thereon and a tacky portion having a tacky exposed top surface area 350 for contacting the soles of the shoes thereon. As can be seen also in Figures 15 and 16, the non-tacky exposed top surface area of the base portion and the tacky exposed top surface area of the tacky portion are both of a size such that an entire sole of an adult-sized shoe is receivable thereon. The continuous non-tacky exposed top surface area 250 of the base portion has a first side area 252 disposed on a first side 352 of the tacky exposed top surface area of the tacky portion and a second side area 254 disposed on a second, opposing side 354 of the tacky exposed top surface area of the tacky portion. The first side area of the continuous non-tacky exposed top surface area of the base portion is larger than the second side area of the continuous non-tacky exposed top surface area of the base portion.

All of the disclosed embodiments are illustrative of the various ways in which the present invention may be practiced. Additionally, any of the disclosed embodiments for the components of the floor mat, e.g., the base portion, the tacky portion, the graphic display, and thus all of the features

associated with these components, may be combined in any embodiment of the present invention and the present invention is not limited to only the particular combined embodiments disclosed. Other embodiments can be implemented by those skilled in the art without departing from the spirit and scope of the present invention.

What is claimed is:

1. A floor mat comprising a top exposed tacky surface, wherein said top exposed tacky surface is formed by combining a first adhesive composition that is tacky when dry with a second adhesive composition that is tacky when wet.

2. The floor mat of claim 1, further comprising an anti-slip component that is a separate structural member from said top exposed tacky surface

3. The floor mat of claim 2, wherein said anti-slip component is a tread.

4. The floor mat of claim 3, wherein said top exposed tacky surface includes an aperture therein and wherein said tread extends through said aperture.

5. The floor mat of claim 3, wherein said tread extends above said top exposed tacky surface.

6. The floor mat of claim 3, wherein said tread extends from a surface of a member disposed under said top exposed tacky surface.

7. The floor mat of claim 3, wherein said tread is an elongated member that has a length extending across said top exposed tacky surface which is substantially greater than a height that said tread extends above said top exposed tacky surface.

8. The floor mat of claim 3, wherein said tread includes a plurality of grooves along the length of the tread.

9. The floor mat of claim 3, wherein said tread is water resistant.

10. The floor mat of claim 2, wherein said anti-slip component remains

functional to prevent slipping on said top exposed tacky surface after a plurality of uses.

11. A floor mat of claim 1, wherein a material that presents said top exposed tacky surface comprises a plurality of material domains such that a combination of said domains is tacky both when dry and when wet.

12. The floor mat of claim 11, wherein said plurality of material domains constitutes at least a portion of a top layer of said floor mat, and wherein said floor mat further comprises a non-tacky hydrophobic layer adjacent to said top layer and a hydrophilic layer adjacent to said hydrophobic layer.

13. The floor mat of claim 12, wherein said floor mat further comprises a wear-resistant anti-skid layer for contacting a floor

13. The floor mat of claim 11, wherein said plurality of material domains includes a tacky pressure-sensitive domain, a non-tacky hydrophobic domain, and a hydrophilic domain.

14. A floor mat of claim 1, wherein said first and second adhesive compositions are arranged in a pattern of alternating regions.

15. The floor mat of claim 14, wherein said first adhesive composition is pressure-sensitive.

16. The floor mat of claim 14, wherein said second adhesive composition includes at least one of natural and synthetic rubbers.

17. The floor mat of claim 14, wherein said alternating regions constitute at least a portion of a top layer of said floor mat, and wherein said floor mat further comprises at least a wear-resistant anti-skid layer for contacting a floor.

18. The floor mat of claim 1, wherein a material presenting said top exposed tacky surface has a uniform composition.

19. The floor mat of claim 18, wherein said uniform composition includes pressure-sensitive adhesives coated with hydrophilic monomers.

20. The floor mat of claim 18, wherein said uniform composition includes pressure-sensitive adhesives mixed with hydrocolloid gums.

21. The floor mat of claim 20, wherein said uniform composition further includes a cohesive agent.

22. The floor mat of claim 1, wherein said floor mat is embossed with a pattern.

23. The floor mat of claim 1, wherein said floor mat is perforated.

24. A floor mat comprising:

a top layer comprising a plurality of material domains such that a combination of said domains is tacky both when dry and when wet;

a non-tacky hydrophobic layer adjacent to said top layer;

a hydrophilic layer adjacent to said hydrophobic layer; and

a wear-resistant anti-skid layer for contacting a floor

25. A floor mat comprising:

a top layer comprising alternating regions of a first adhesive composition that is tacky when dry, and a second adhesive composition that is tacky when wet; and

a wear-resistant anti-skid layer for contacting a floor.

26. A floor mat comprising:

a top layer of material which is tacky when dry;

a second layer of material adjacent to said top layer, said second layer being tacky when wet; and

a wear-resistant anti-skid layer for contacting a floor;

wherein said top layer has holes for allowing a surface to be cleaned to contact said second layer while also contacting said top layer.

27. The floor mat of claim 27, wherein said second layer is hydrophilic.

28. A floor mat comprising:

a top layer comprising a plurality of materials blended to produce a uniform texture, wherein at least a first of said plurality of materials is a pressure-sensitive dry adhesive, and at least a second of said plurality of materials is a hydrocolloid gum; and

a wear-resistant anti-skid layer for contacting a floor.

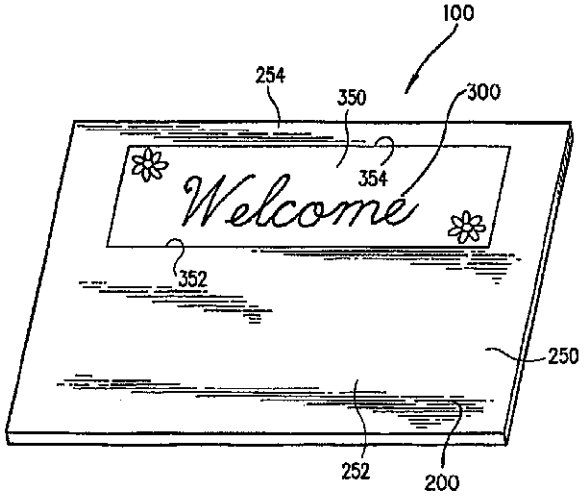


FIG.1

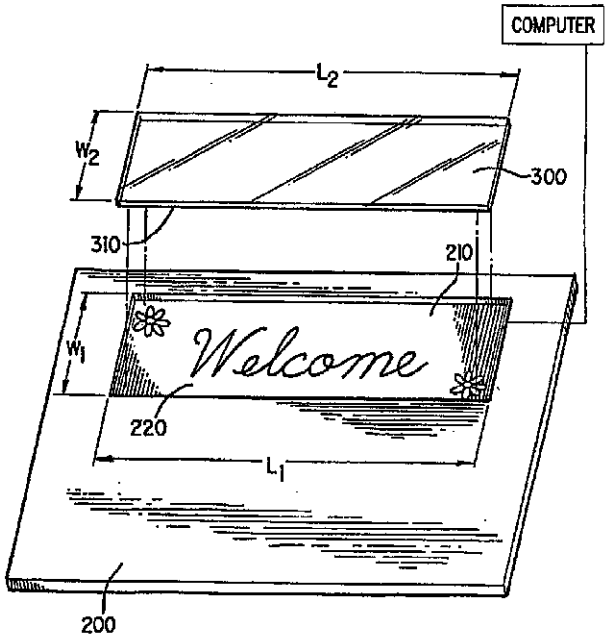


FIG.2

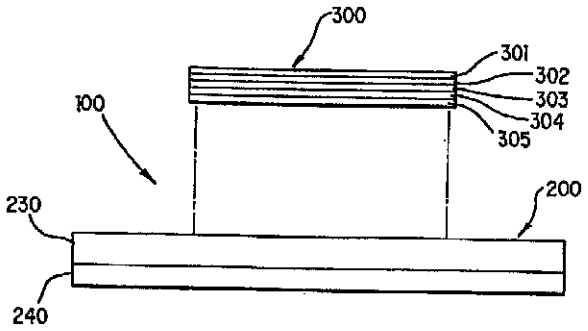


FIG.3

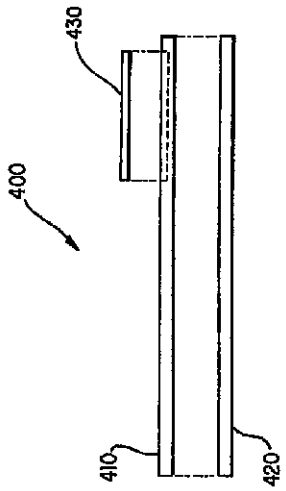


FIG.4

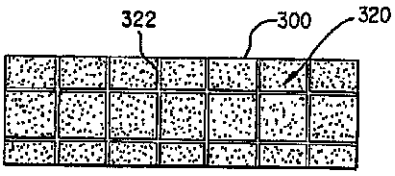


FIG.5

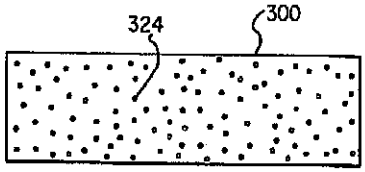


FIG.6

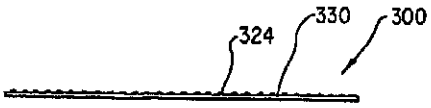


FIG.7

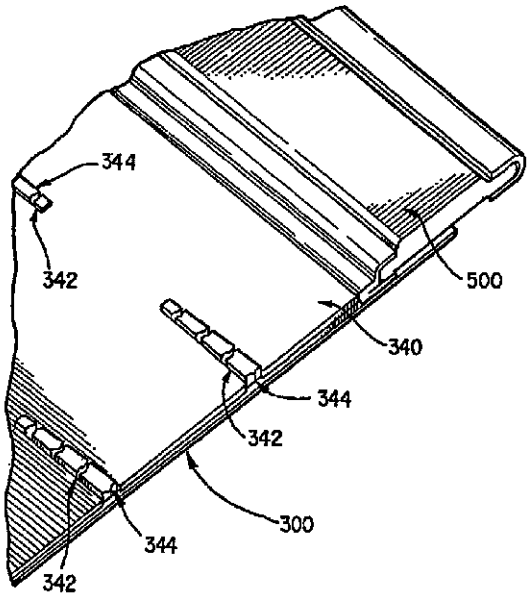
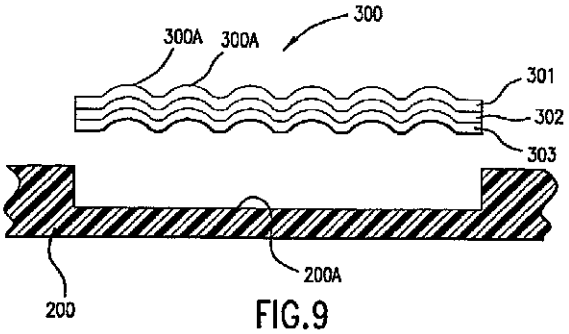


FIG.8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303
200A
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FIG.9

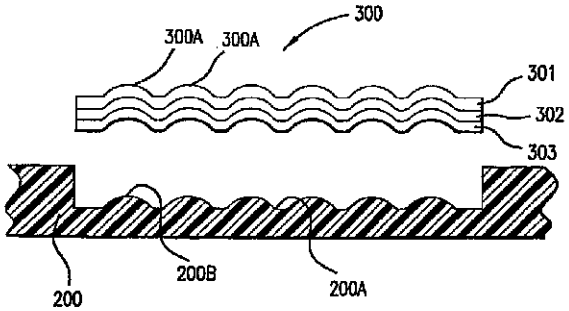
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FIG.10

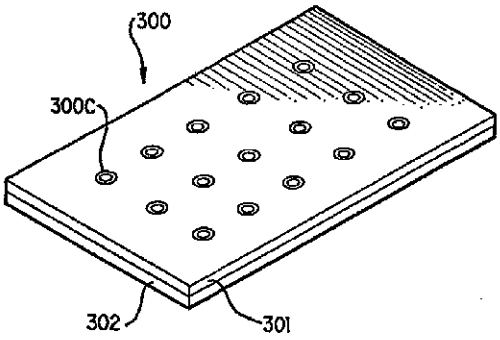

FIG. 11

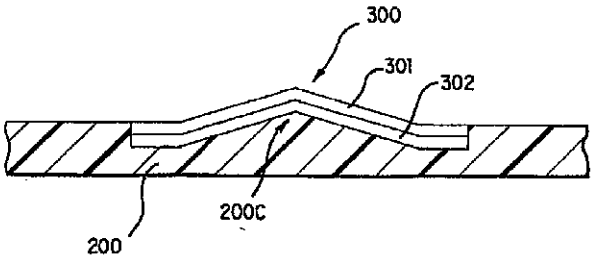

FIG. 12

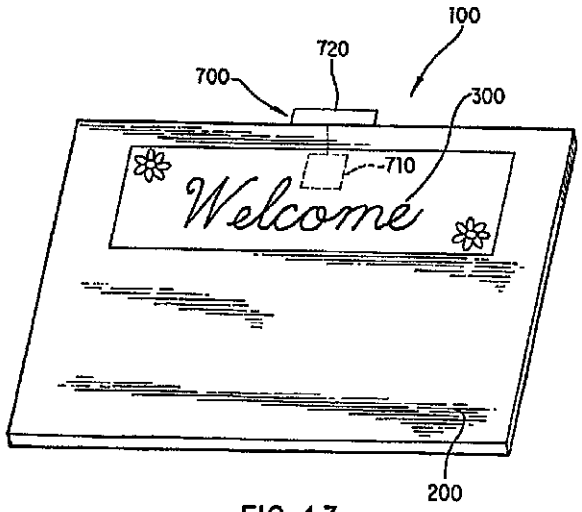

FIG. 13

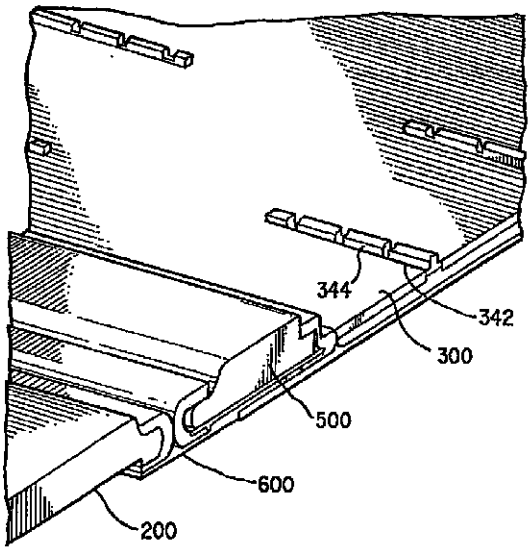

FIG. 14

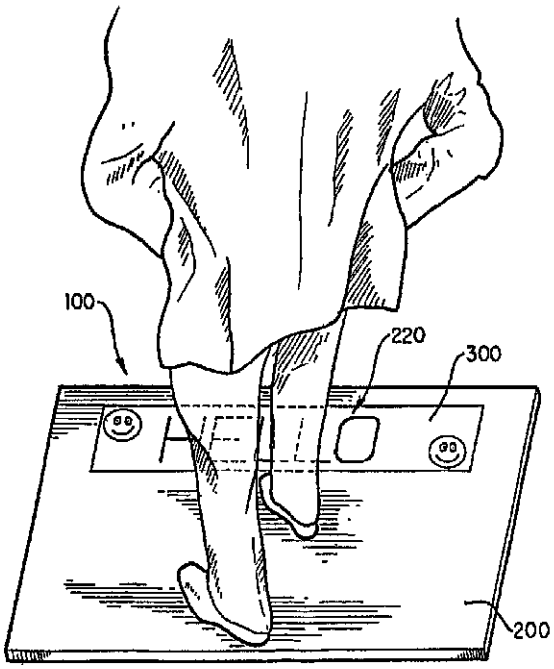

FIG. 15

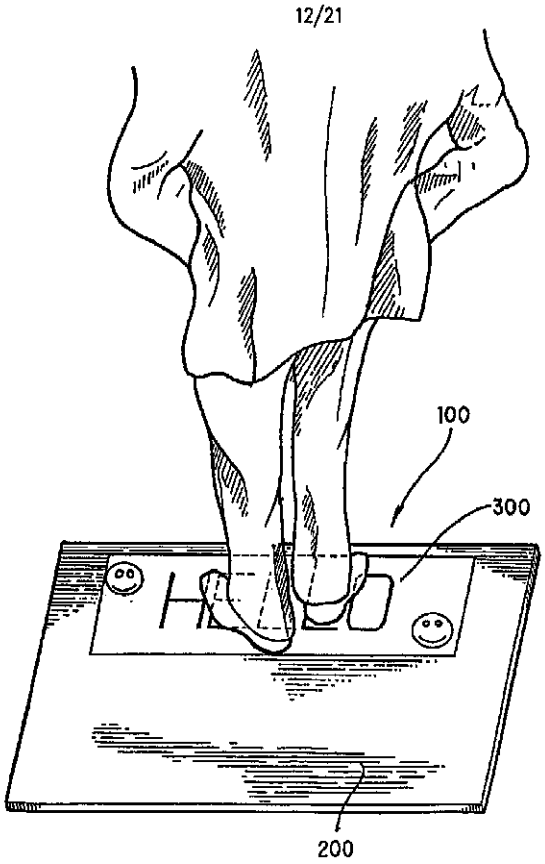

FIG. 16

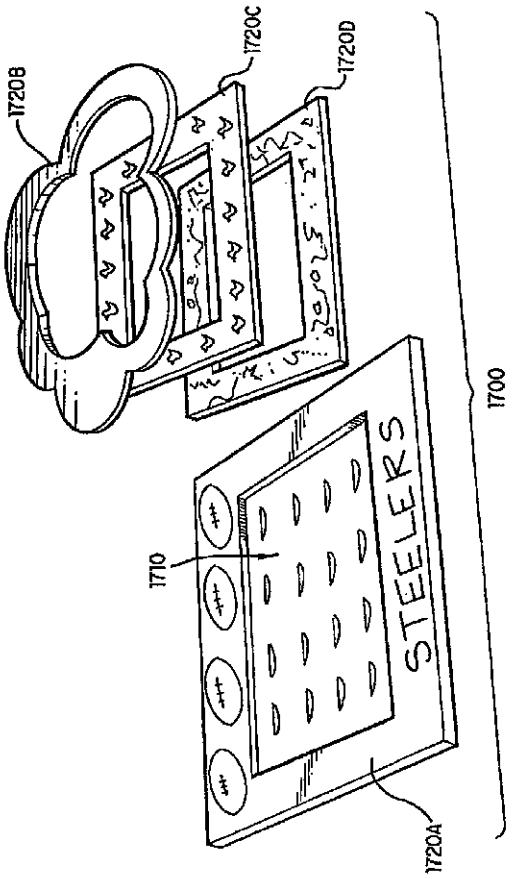

FIG. 17

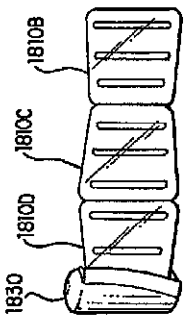

FIG. 19

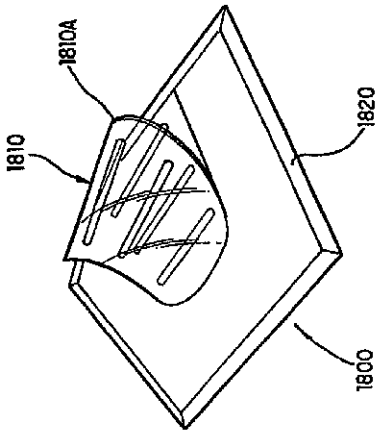

FIG. 18

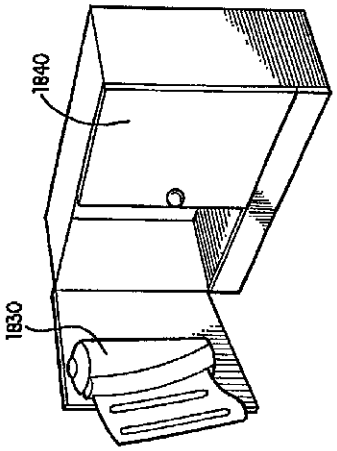

FIG. 20

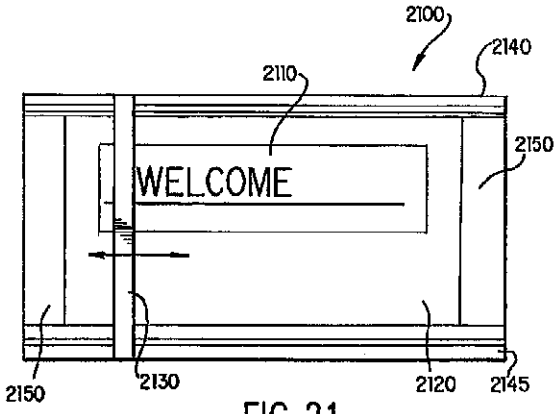
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FIG. 21

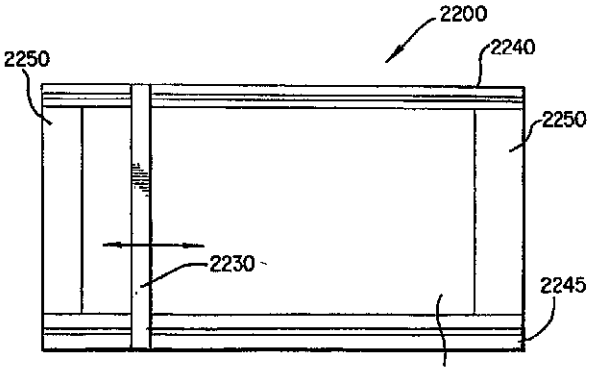
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FIG. 22

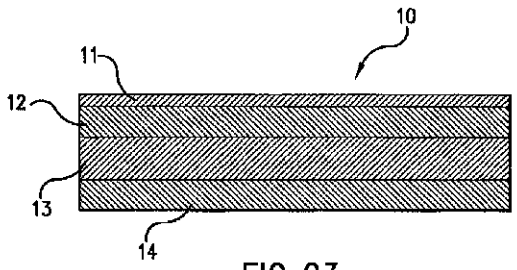

FIG. 23

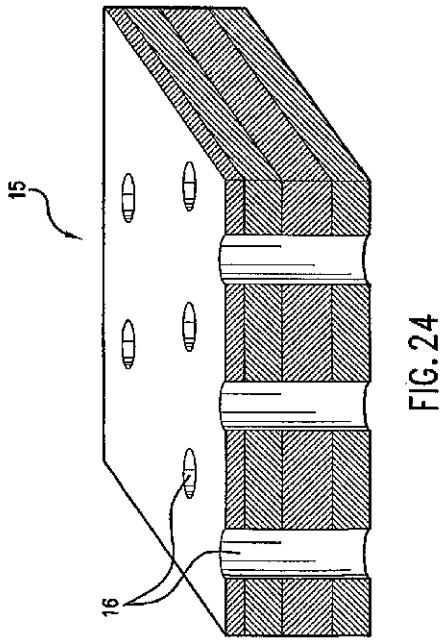

FIG.24

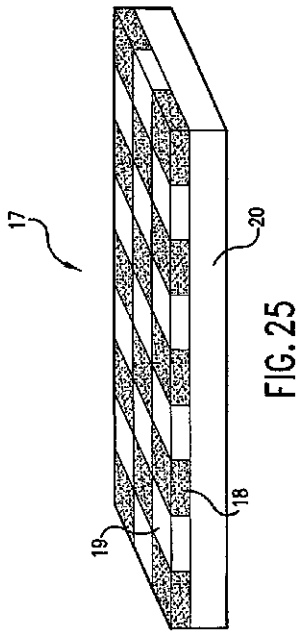

FIG. 25

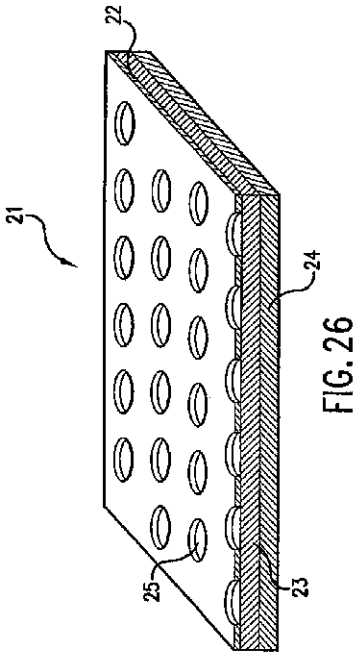

FIG. 26

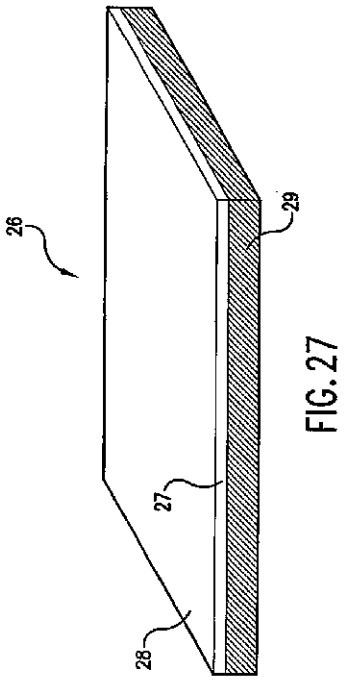

FIG. 27

【国際調査報告】

INTERNATIONAL SEARCH REPORT

International Application No
PCT/US 01/42910

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 A47L23/22 A47L23/26

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 A47L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y A	GB 2 054 369 A (SPIRIG,E.) 18 February 1981 (1981-02-18) the whole document	1,2,11, 17,25 10,13
Y	PATENT ABSTRACTS OF JAPAN vol. 1998, no. 01, 30 January 1998 (1998-01-30) & JP 09 253023 A (DAIKEN IKI KK), 30 September 1997 (1997-09-30) abstract	1,2,11, 17,25
A	DE 26 39 289 A (DOBA,GEB.BURGHARDT,I.) 2 March 1978 (1978-03-02) the whole document	3,6, 8-10,13, 15,16,18

-/--

[X] Further documents are listed in the continuation of box C. [X] Patent family members are listed in annex.

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"P" document published prior to the international filing date but later than the priority date claimed

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
19 June 2002	01/07/2002

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax. (+31-70) 340-3016	MUNZER, E

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INTERNATIONAL SEARCH REPORT

International Application No
PCT/US 01/42910

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	GB 2 268 399 A (ANTONY MORRIS COPP) 12 January 1994 (1994-01-12) page 2-4; claim 1; figures 1-4	2,3,8, 10,13,17
A	US 3 665 543 A (NAPPI,J.J.) 30 May 1972 (1972-05-30) the whole document	1,2,10, 13

Form PCT/ISA/210 (continuation of second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/US 01/42910

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
GB 2054369	A	18-02-1981	NONE		
JP 09253023	A	30-09-1997	NONE		
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GB 2268399	A	12-01-1994	NONE		
US 3665543	A	30-05-1972	NONE		

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フロントページの続き

(81)指定国 AP(GH,GM,KE,LS,MW,MZ,SD,SL,SZ,TZ,UG,ZW),EA(AM,AZ,BY,KG,KZ,MD,RU,TJ,TM),EP(AT,BE,CH,CY,DE,DK,ES,FI,FR,GB,GR,IE,IT,LU,MC,NL,PT,SE,TR),OA(BF,BJ,CF,CG,CI,CM,GA,GN,GQ,GW,ML,MR,NE,SN,TD,TG),AE,AG,AL,AM,AT,AU,AZ,BA,BB,BG,BR,BY,BZ,CA,CH,CN,CO,CR,CU,CZ,DE,DK,DM,DZ,EC,EE,ES,FI,GB,GD,GE,GH,GM,HR,HU,ID,IL,IN,IS,JP,KE,KG,KP,KR,KZ,LC,LK,LR,LS,LT,LU,LV,MA,MD,MG,MK,MN,MW,MX,MZ,NO,NZ,OM,PH,PL,PT,RO,RU,SD,SE,SG,SI,SK,SL,TJ,TM,TR,TT,TZ,UA,UG,UZ,VN,YU,ZA,ZW

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Ｆターム(参考) 3B120 AB18 BA09 EA04 EB01 EB04 EB07