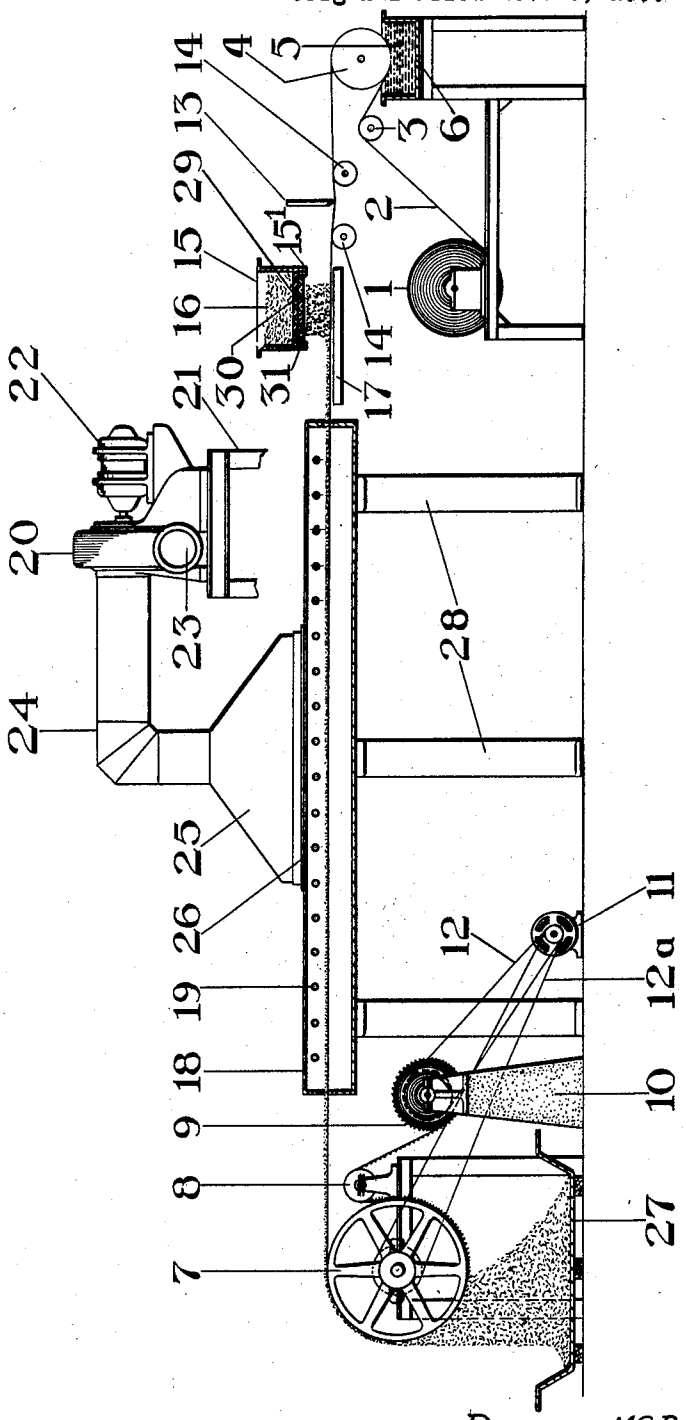
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CONTINUOUS METHOD OF APPLYING GLASS SPHERES OR PARTICLES TO FLAT SURFACES

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CONTINUOUS METHOD OF APPLYING GLASS SPHERES OR PARTICLES TO FLAT SURFACES

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1 Claim. (Cl. 41—36)

This invention relates to the application of glass beads, prisms, rods or finely ground glass to flat surfaces, and more particularly to an improved process for the application of particles of this character to a continuously moving strip of fabric or paper base covered with an improved adhesive.

In the usual practice of applying glass beads to coated fabrics for ornamenting costumes, slipper material, and for moving picture screens, it has usually been the practice to apply the beads by scattering them over a surface which has been freshly japanned or varnished. After drying the excess beads are brushed or shaken off, and the beaded surface of the finished product results from the beads which remain anchored. This method usually requires a number of hours for completion because of the time required for the adhesive to dry and consequently the application of beading is intermittent rather than continuous with an accompanying variation in the uniformity of the finished product.

This invention has as an object an improved method for applying glass beads or similar particles to flat surfaces. Another object is to provide an improved process for the continuous application of glass beads or similar particles to a continuously moving strip of sheet material. Another object resides in an improved process for applying glass beads or similar particles to sheet material which will result in a product having improved optical properties. Another object is an improved process for applying glass beads or similar particles to base material covered with an improved adhesive which results in a better anchorage of the particles on the base material. Another object is an improved process for applying glass beads or similar particles to base material in the form of a pattern or design. A still further object resides in the mechanism utilized to carry out our improved process.

These objects are accomplished by the following preferred mode of procedure described in connection with the single figure in the drawing which is the side view of the mechanism suitable for carrying out the invention.

The numeral 1 designates the roll or material, such as paper or fabric, to which the glass beads or particles are to be applied. The base material 2 passes over a roller 3 which, together with the roller 4 around which the material passes, serves as a guiding means to direct the material into the adhesive 5 contained in the receptacle 6. After the sheet material 2 passes over the roller 4, it moves in a substantially horizontal plane around a pull roll 7 and over a roller 8 to the windout roll 9, journalled in the support 10. The rolls 7 and 9 are driven by a motor 11 thru a belt 12 as shown, and it is by this means that the sheet material 2 is unrolled from the roll 1 and drawn thru the mechanism which results in the application of the glass beads or particles to the material. After the sheet material 2 has been dipped into the adhesive 5, by passing around the roller 4, the adhesive is spread and evenly distributed over the material by means of a scraping or doctor knife 13, supported by any suitable means (not shown). The doctor knife 13 bears against the material 2 between two rollers 14. The coated material then passes beneath the receptacle 15 containing the glass beads or particles 16 which fall onto the material 2, thru screens, in a regulated manner hereinafter described.

A shelf or ledge 17 is placed under the material 2 at the place of the application of the particles in order to prevent the material from sagging. The material, with its coating of glass particles, then passes thru a drying chamber 18, carried by supports 28 and heated by steam coil 19. The drying chamber is ventilated by means of a fan contained within the housing 20, which is supported by a base 21. The fan, driven by a motor 22, draws air from the openings at each end of the machine thru which the material passes, thru the funnel-like portion 25 to the conduit 24, and finally thru the fan outlet 23. As the particle covered material passes around the pullwheel 7, the excess particles are deposited in the pan 27.

The receptacle for the particles 16 has a screen bottom 29, the mesh of which is just sufficient to allow the particles to pass thru. The screen 29 slides on a second screen 30 of substantially the same mesh as the screen 29. The necessary relative motion between the screens 29 and 30 required to permit the passage of particles 16 thru the two screens may be obtained in any desired manner.

In the present embodiment of the invention we have illustrated the screen 30 as the stationary screen having suitable supporting means (not shown). The receptacle 15 is provided with flanges 15' which straddle the frame pieces 31 of the screen 30 and permit the receptacle 15 to be reciprocated over the screen 30.

This screen combination above described may be referred to as a "sieve-valve". The deposition of the particles in the manner permitted by this

valve contributes materially to the success of the process.

In the case of a number of substances, such as cotton flock or finely ground cork, a single screen is sufficient to support the material when stationary, yet when shaken will permit it to freely pass thru. However, the density of glass is such that beads or finely ground particles will pass thru a single screen even when stationary, unless the screen is of such fine mesh that the particles cannot be made to pass thru even when vigorously shaken. By employing two screens of the proper mesh, however, this can be controlled since the interstices of the screens are blocked except when one of the screens moves over the other. This motion may either be reciprocating or rotary, and the necessary movement of one screen relative to the other may be effected manually, or the movable screen may be connected to the mechanism for driving the sheet material so as to regulate the quantity of the particles deposited with respect to the length of the material **2** which passes in a given time underneath receptacle **15**. By this means it has been found that a uniform distribution of beads can be applied continuously to a moving base material. It will be understood, however, that either screen may be the movable one, thus the receptacle may be held stationary and the bottom screen **30** moved in its plane relative to the screen **29**.

Several advantages flow from the method of applying the glass particles as above described. In this connection the application of adhesive by the combined use of the dipping roll **4** and the doctor knife **13** is especially advantageous. We have found that the application of the adhesive by the use of a knife alone results in scratches which are very undesirable and furthermore, the adhesive so applied does not give satisfactory anchorage.

The use of the dipping roll alone results in the desired anchorage, but due to a very slight unevenness of flow the frequent anchorage of more than one thickness of beads produces a very undesirable optical effect, which is especially disadvantageous when the product is used as a moving picture screen. By the combination of dipping roll and doctor knife herein disclosed, these disadvantages are overcome and a product having the desired optical properties with the beads firmly anchored is produced in a continuous operation.

The type of adhesive found to give best results in connection with the present process may be described as a cellulose nitrate composition containing a suitable solvent softener. The practical operating limits of this formulation and the preferred composition are as follows:

	Operating range	Preferred
	Per cent	*Per cent*
Cellulose nitrate	6–12	8
Ethyl acetate	40–70	64
Butyl acetate	10–30	20
Tricresyl phosphate	6–12	8

By a slight modification of the procedure already described the anchorage of beads in a definite pattern or design on only a portion of the base material may be accomplished. For this purpose the base material is embossed in the desired pattern and then passed under a "sharp" doctor knife. In this way the adhesive composition is applied only to the depressed portion of the design, with the result that the beads when applied are anchored only in this pattern. Similar results may also be obtained by spraying the adhesive composition thru a stencil of the desired pattern. The practical operation limits and the preferred formula for a spraying composition suitable for this purpose are as follows:

	Operating range	Preferred
	Per cent	*Per cent*
Cellulose nitrate	6–12	8
Ethyl acetate	20–40	25
Ethyl alcohol	10–20	14
Butyl acetate	30–50	35
Butyl alcohol	10–20	10
Tricresyl phosphate	6–12	8

The objects of this invention may also be successfully accomplished by using other types of adhesives, as for instance cellulose nitrate lacquers employing other solvent softeners than tricresyl phosphate, such as dibutyl tartrate, acetyl laurins, dibutyl phthalate, butyl lactate, etc. The use of a cellulose nitrate lacquer is likewise not essential as dispersions of other cellulosic derivatives, such as cellulose acetate may also be employed.

By the process described glass beads and particles may be applied to a base material consisting of coated fabric of various weights and colors. Among these may be specifically mentioned base material having various decorative designs and printed patterns as well as material prepared from coating compositions containing metallic bronze and aluminum pigments.

The finished material resulting from this process is characterized by an anchorage of the glass beads, or particles, which by direct comparison, has been found superior to that of beaded material now on the market. In addition to this is the high degree of optical uniformity resulting from the even application of the adhesive and deposition of the beads. In addition to the realization of a product of improved quality, a further advantage, which results from our method of continuous operation, is the greatly increased rate of production, as compared with the methods commonly employed in the manufacture of beaded surfaces.

As many apparently widely different embodiments of this invention may be made without departing from the spirit and scope thereof, it is to be understood that we do not limit ourselves to the specific embodiments thereof except as defined in the appended claim.

We claim:

A process comprising dipping the surface of a continuously moving strip of embossed sheet material into an adhesive, scraping the moving strip of sheet material to remove the adhesive from the high portions of the design of the embossed material, depositing glass particles over the adhesive in the depressed portions of the design, and drying the adhesive after the sheet material passes the position at which the particles were deposited.

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