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APPARATUS FOR THE MANUFACTURE OF ABRASIVE COATINGS

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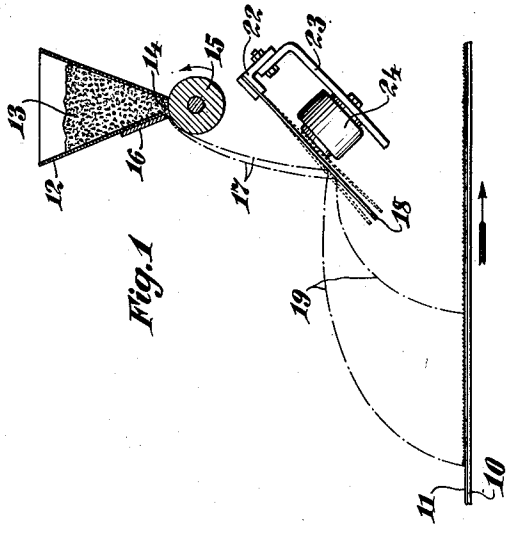


Fig. 1

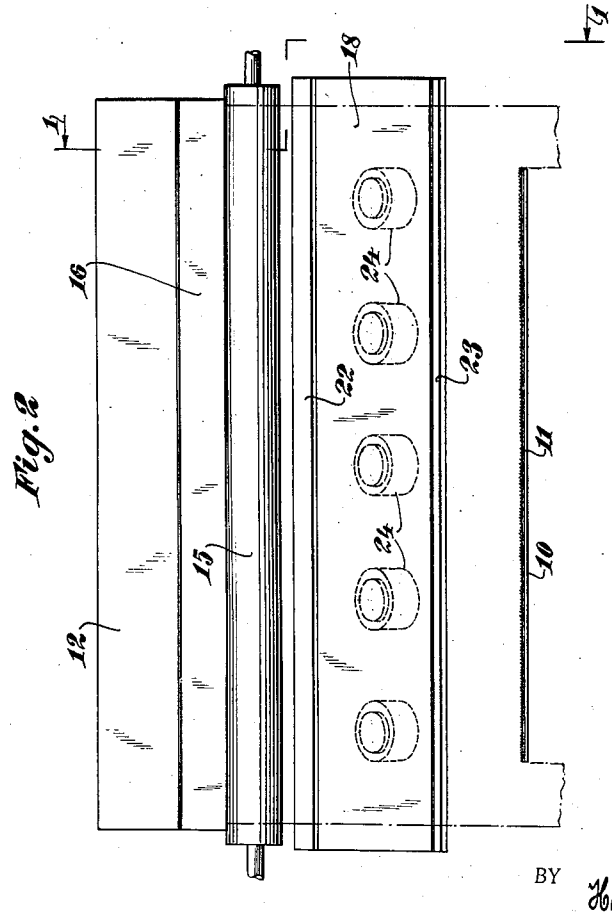


Fig. 2

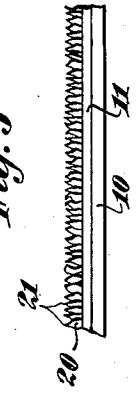


Fig. 3

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APPARATUS FOR THE MANUFACTURE OF ABRASIVE COATINGS

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6 Claims. (Cl. 91—43)

The present invention relates to devices for producing coatings and relates, more particularly, to devices by means of which abrasive coatings such as sandpaper, etc., may be formed in an improved fashion.

Various devices have heretofore been used in the manufacture of sandpaper and kindred articles, these devices being designed with a view to facilitating the formation of coatings, but it has been found that great difficulty is experienced in securing an even scattering of the grains to prevent bunching or grouping thereof. Such existing devices are further characterized by the relatively great speed at which their parts move, resulting in high maintenance cost, and further by the fact that they produce uncontrollable air currents which tend to prevent even distribution of the grains which form the coating.

In accordance with the present invention, it is proposed to provide a device by means of which coatings may be formed characterized by even grain distribution.

A further object of the invention is to provide a device of the above character wherein the grains of the coating are oriented to a greater extent and more effectively than in existing devices.

A further object of the invention is to provide a device of the above character which does not produce objectionable air currents and which is characterized by low initial and maintenance cost.

The foregoing objects are attained, in accordance with the form of the invention described herein, by means of a mechanism which subjects the grains to a motion under which the particles are orientated during the travel thereof toward the surface to be coated. This motion, in the device described herein, is such as to cause alignment of the longest axes of the grains due to the action of the propelling and gravitational forces thereon, in combination with air resistance to which the grains are subjected during their travel to the surface to be coated.

Other objects and advantages of the invention, as well as structures by means of which the invention may be practiced, will be apparent as it is described in further detail in connection with the accompanying drawing, wherein

Figure 1 is a view in side elevation partly in section on the line 1—1 of Figure 2, and looking in the direction of the arrows, illustrating one form of mechanism by means of which the present invention may be practiced;

Figure 2 is a view in front elevation, showing the mechanism of Figure 1; and

Figure 3 is an enlarged detail view of a coating which has been applied to a surface in accordance with the present invention.

Referring to the above drawing, a sheet 10 is shown as travelling in the direction indicated by the arrow in Figure 1. This sheet may be mounted upon any suitable supporting mechanism upon which the related elements described hereinafter may also be supported. Inasmuch as these supporting elements form no part of the present invention, this description will be directed only to the elements which are necessary to carry out the invention in the form of mechanism described herein. It will also be understood that the paper, cloth, or other surface to which the abrasive or other coating is to be applied, is provided with a coating 11 of glue prior to directing the surface under the coating elements which will now be described.

Extending transversely of the direction of travel of the surface 10 to be coated, is a trough or hopper 12 within which sand 13 is supplied. The trough may have a lower elongated opening 14 through which the sand may be discharged as desired. To facilitate the discharge of the sand, roller 15 is shown as being rotatably mounted directly beneath the opening 14 and as rotated in the direction of the curved arrow shown in Figure 1. A gate 16 or other suitable device may be provided to limit the amount of sand discharged from the trough or hopper 12, although the specific discharging mechanism for the hopper may be varied in any desired fashion.

The discharge mechanism (in the form shown, the roller 15) preferably discharges the sand outwardly and downwardly in the path indicated generally by the dot and dash lines 17 in Figure 1.

While the particles of sand are falling from the discharge mechanism, and before they have reached the glue-coated surface 11, they are acted upon by a plate 18 which is positioned in the path of the falling particles of sand and are directed outwardly and downwardly in the general path indicated by the dot and dash lines 19 of Figure 1. The trajectory of the particles of sand from the plate 18 may be obviously varied by variation of the factors described hereinafter and, after the particles have travelled through their trajectory, they fall upon and adhere to the coating of glue 11 on the surface 10. Figure 3 illustrates the particles of sand which have adhered to the coating of glue, these particles being indicated at 20.

From an inspection of Figure 3, it will be seen that the points 21 of these particles extend upwardly from the surface 10, the longest axes of the grains of sand extending substantially normal to such surface.

The plate 18 is preferably securely clamped at one end in a bracket or similar device 22 which may be secured upon a mounting plate 23. In order that the plate 18 may strike the grains of sand and subject them to the proper forces, the plate is vibrated at a suitable speed in any desired fashion. In the form shown in the accompanying drawing, such vibration is effected by means of electromagnets 24, which may be mounted upon the plate 23 and which are suitably spaced with respect to the width of the plate 18 and its fixed supporting element 22. Variation of the position of the electromagnets 24 toward or away from the fixed supporting bracket 22 obviously produces a corresponding variation in the effect of the electromagnets upon the amplitude of motion or vibration of the plate 18. Such amplitude of movement may also be controlled by varying the electrical conditions in the circuits of the magnets. By subjecting the electromagnets 24 to periodic electrical energization, the plate 18 will be subjected to corresponding periodic vibrations. Obviously, by energizing the electromagnets 24 with an alternating or other form of interrupted or variable current, this periodic vibration of the plate 18 may be effected, variation in the frequency of vibration being conveniently varied by variation of the frequency of the alternating current to which the electromagnets 24 are subjected.

It will thus be seen that the plate 18 may be subjected to vibrations of desired amplitude and frequency, which vibrations serve to cause the grains of sand falling through the path 17 to be struck by the plate and impelled outwardly in the path indicated generally by the dot and dash lines 19. There results a throwing of the grains of sand through a much greater horizontal distance and the tendency of the grains to bunch upon the surface 10 is thus eliminated. This action results in a more even distribution of the grains in the coating and the travel of the grains through the trajectory 19 results in a tendency of the grains to orient themselves in such fashion as to cause them to strike the glue-coated surface with their longest axes vertical or, in other words, normal to the surface 10. The desired aligning of the grains is due to a combination of influences including the action of the propelling forces, gravity, the interaction of the grains on one another while travelling at high velocity, and air resistance to the travel of the grains from the plate 18 to the coated surface. As a result of the orientation of the grains, a sharper cutting type of abrasive coating is produced.

Obviously, any desired vibrating instrumentality may be used, either mechanical or electrical. If the vibration of the plate is controlled electrically, as in the form shown in the accompanying drawing, the frequency and amplitude of vibration may be controlled within any desired range in a convenient and effective manner. By varying the frequency and/or amplitude, it is possible to control the distribution and orientation of the grains within practically definite limits, thus providing for all desirable variations in size and type of grains, density of coating, and even the degree of sharpness desired in the finished product.

It will be understood that grains thrown with too great a force may reach their destination before they become aligned with the direction of travel thereof, or, contrariwise, if projected with too weak a force, the herein described influences may not cause them to become so aligned. To secure best results, accordingly, there will be found to exist a critical adjustment of the grain distributing means which will produce best results for any desired type of coating. Moreover, by controlling the vibration of the plate 18 electrically, and using an alternating or other variable form of current, together with means for controlling the frequency and amplification thereof, the frequency and amplitude of vibration of the plate 18 is conveniently controlled. Adjustment of the foregoing factors is found to be of advantage in correcting changing conditions such as changes in atmospheric moisture, the size and shape of grains, the rate of flow of the sand, the speed of travel of the paper, etc.

It will be apparent that the invention may be embodied in a mechanism wherein the coated surface may be passed above the element carrying the grains to be applied thereto, means being provided to propel the grains from the last named element upwardly to the coated surface. Such means may be in the form of a means for vibrating the element carrying the grains by any suitable member.

The number of magnets may be varied as desired to give uniform vibration throughout the length of the plate 18 and the position of the magnets with respect to the plate may also be varied. Moreover, each of the magnets 24 may be controlled by a separate switch in order that the vibrating impulses may be variably applied to the plate at different points and for different purposes. Refinements in the control of the magnets, for example, by varying the frequency, wave forms, and intensities of current may obviously be effected, and the invention is not to be limited, save as defined in the appended claims.

I claim:

1. A coating machine comprising a receptacle for abrasive particles to be applied as a coating, means to cause the particles to fall freely from the receptacle to material to be coated, and solid mechanical means to intercept and accelerate movement of the particles while freely falling and in their travel from the receptacle to material to be coated.

2. A coating machine comprising a receptacle for abrasive particles to be applied as a coating, means to discharge the particles from the receptacle to fall by gravity, a plate in the path of the particles falling from the receptacle, and means to vibrate the plate.

3. A coating machine comprising a receptacle for abrasive particles to be applied as a coating, means to discharge the particles from the receptacle to fall by gravity, a plate in the path of the particles falling from the receptacle, and electrical means to vibrate the plate.

4. A coating machine comprising a receptacle for abrasive particles to be applied as a coating, means to discharge the particles from the receptacle to fall by gravity, a plate in the path of the particles falling from the receptacle, means to anchor one end of the plate, and means to vibrate the plate.

5. A coating machine comprising a receptacle for abrasive particles to be applied as a coating, means to discharge the particles from the receptacle to fall by gravity, a plate in the path of the

particles falling from the receptacle, means to anchor one end of the plate at an angle to the path of the falling particles, and means to vibrate the plate.

6. A coating machine comprising a receptacle for abrasive particles to be applied as a coating, means to discharge the particles from the receptacle to fall by gravity, a plate in the path of the particles falling from the receptacle, means to anchor one end of the plate, and electromagnetic means to vibrate the plate.

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