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PRECISION COATING DEVICES

Filed Jan. 25, 1961

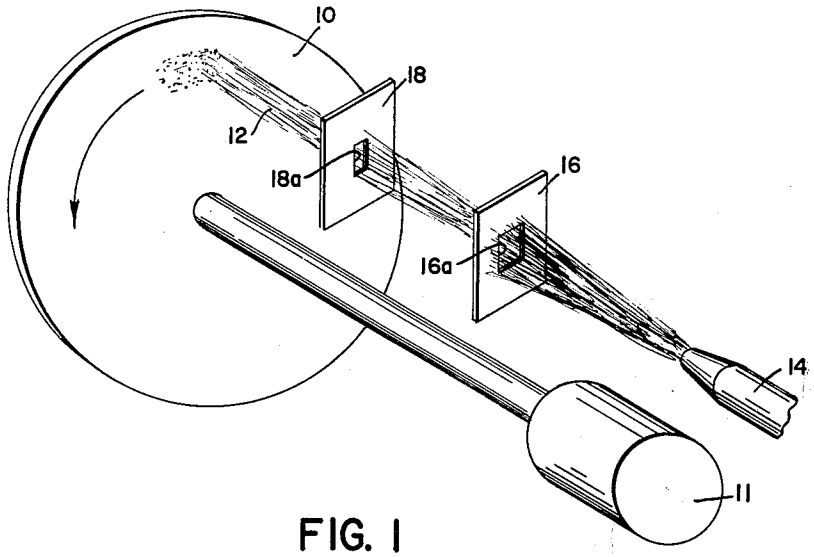

FIG. 1

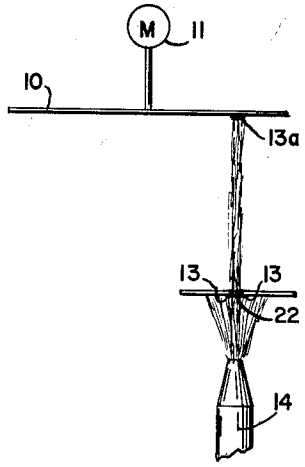

FIG. 2

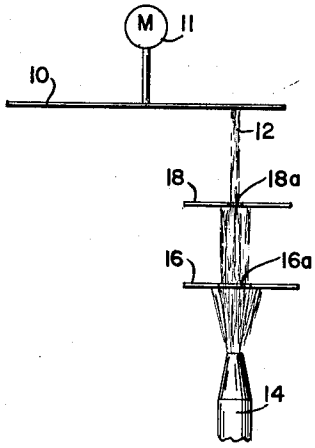

FIG. 3

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PRECISION COATING DEVICES

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2 Claims. (Cl. 118—301)

This invention relates to an improved collimator device for producing a shaped jet of a sprayed material. The term "collimator" is used herein in a sense somewhat different from, but related to, its use in optics. It describes a device which serves to define the direction and to limit the area and deviation from parallelism of a portion of a jet of material issuing from a spray nozzle. In this respect, the device acts much as the optical collimator selects and defines the path of a portion of a stream of light. As described herein, a suitably shaped and positioned orifice acts in co-operation with a spray nozzle so as to define a jet of sprayed material.

In certain processes, a jet of vaporized metal or other coating material is projected upon a moving body by means of a sprayer or atomizer to provide a track of sprayed material. In order that the track accurately conform to a desired pattern, it is often necessary to restrict the dimensions of the jet to within predetermined boundaries. This is accomplished by interposing between the article to be coated and the spray source a template. However, it has been found that a build-up of the coating material readily forms on the template and that eventually a clump of material passes through the opening and is deposited onto the article to be coated. This problem is particularly acute where the aperture in the template is of relatively small dimension. It is an object of this invention to provide a device which will prevent this occurrence.

Another disadvantage of the prior art template apparatus is that it requires frequent cleaning during operation. Accordingly, it is a further object of this invention to provide an apparatus which does not require frequent interruptions of the coating process.

Still other objects and advantages of the invention will, in part, be pointed out with particularity and will, in part, become obvious as the following description proceeds taken in conjunction with the accompanying drawing.

In the drawing:

FIG. 1 is a perspective view of the apparatus of this invention employed in conjunction with a member being coated.

FIG. 2 shows in plan the prior art apparatus.

FIG. 3 shows in plan the apparatus of this invention.

Referring now to FIG. 1, there is shown a member **10** upon which it is desired to form a coating. The member **10** is rotated by means of motor **11** past a jet of coating material **12** provided by sprayer **14**. The jet passes through orifice **16***a* of template **16** which shapes the jet to the approximate cross section desired. The jet then passes through orifice **18***a* of member **18**, which orifice is of smaller size than orifice **16***a*, and produces a pattern on the member **10** of the desired shape and cross section. Suitable control means for controlling the movement of member **10** are provided but do not form a part of the present invention.

Referring now to FIG. 2, there is shown the effect of the prior art single template collimator arrangement. It will be noted that the sprayed material **12** piles up along the edge of the orifice **22** forming clumps **13**. Under the action of the jet stream **12**, the clumps occasionally pass through and are deposited on the base **10**. A clump that has passed through is identified by reference numeral **13***a*. If the orifice **22** is of small dimension, it will quickly be closed by the deposit. Of course, if the plate is frequently cleaned this effect can be avoided, but in general, frequent cleaning of the template is a time-consuming and destructive operation and is normally undesirable in production work.

It has been found that when orifice **22** is very small it may, in practice, become completely clogged with sprayed material so rapidly as to prevent uniform deposition of a pattern during a single revolution of that base.

On the other hand, as shown in FIG. 3, the present invention eliminates the difficulties of the prior art approach by the provision of template **16** which removes much of the excess material, thus greatly minimizing the portion of the jet to be removed by the second template **18**. This is of particular importance when a narrow orifice, say, only a few thousandths of an inch wide, is employed. Such an orifice tends to rapidly clog. The use of the second template increases productivity of a precision spraying operation.

The shape of orifice **16***a* is preferably generally similar to that of orifice **18***a*, but particularly where the orifices are small, the shape of orifice **16***a* may depart from that of orifice **18***a* within limits more specifically stated below. In this connection, it should be noted that the invention has been found to be particularly useful when the smallest dimension of orifice **18***a* is 0.250 inch or less, and especially when it is 0.050 inch or less. Orifices having such dimensions as 0.100 inch by 0.010 inch are not unusual.

The orifice **16***a* should be shaped so that its largest dimension is no greater than 40% larger than the corresponding dimension of orifice **18***a*. It should be shaped so that the largest divergence between the projection of orifice **16***a* on the collimator of orifice **18***a* and the outline of orifice **18***a* is less than 0.080 inch. It is theorized that part of the benefit accruing to the use of the double collimator arises from "diffraction" of some of the material passing near the edge of the orifice which lies closer to the source of the jet of sprayed material. Be that as it may, it is surprising that an arrangement of two collimators as described need be cleaned far less than half as often as a single collimator.

Having thus disclosed the best embodiment of the invention presently contemplated, what is claimed is:

1. A precision spraying apparatus for coating a workpiece comprising in combination:
   a jet spray source;
   a first template having an orifice positioned in the path of the jet emanating from said source; and
   a second template positioned between said first template and the workpiece, said second template having an orifice positioned in line with the orifice of said first template, said second template orifice being smaller than the orifice of said first template, the largest divergence between the projected outlines of the first and second template orifices being less than 0.080", the smallest dimension of said second template orifice being within the range of 0.010" to 0.025" and wherein the workpiece is positioned directly in line with said orifices during coating, said jet being directed through said orifices so at impinge directly on the workpiece.

2. The apparatus of claim 1 wherein the area of the orifice of said second template differs from the area of said first template by less than 40 percent.

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