United States Patent [19]

Colegrove et al.

[11] **3,886,898**

[45] **June 3, 1975**

[54] **MULTIPLE, CONTIGUOUS STRIPE, EXTRUSION COATING APPARATUS**

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[73] Assignee: **Burroughs Corporation,** Detroit, Mich.

[22] Filed: **Dec. 19, 1973**

[21] Appl. No.: **426,022**

[52] **U.S. Cl.** **118/411;** 118/413; 118/415

[51] **Int. Cl.** **B05c 5/02**

[58] **Field of Search** 118/410, 411, 412, 413, 118/407, 415

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[57] **ABSTRACT**

Apparatus for coating moving webs comprising a stationary block-like member or members provided with individual fluid introducing orifices connected to a fluid metering cavity within each block-like member and wherein adjustable dam means are arranged adjacent to the face of the cavity opening to adjust the coating thickness and wherein individual separators are positioned adjacent to the contiguous faces of the block-like members so that a plurality of different materials may be simultaneously coated or applied to a moving web or material stock in parallel contiguous tracks without intermixing.

3 Claims, 7 Drawing Figures

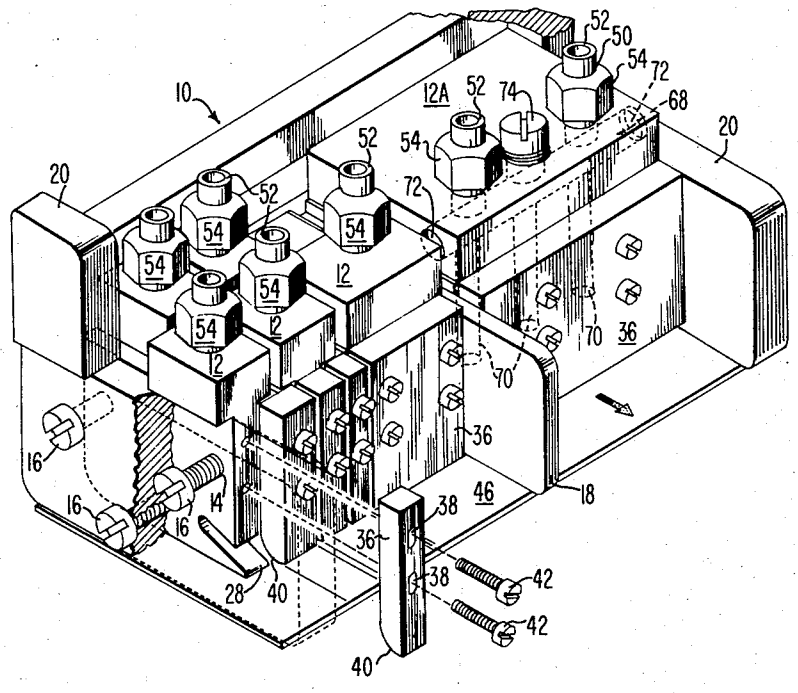


FIG. 1.

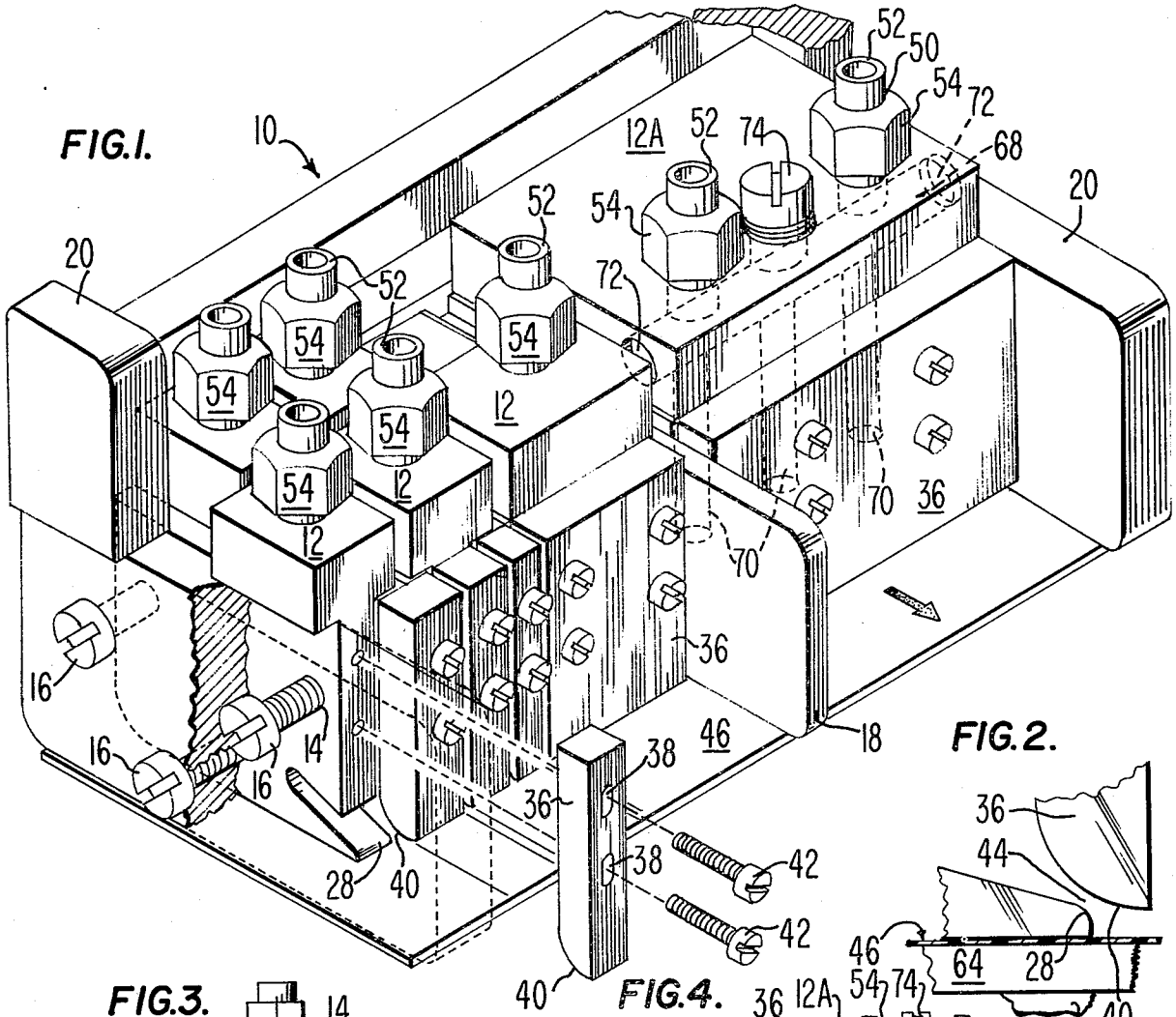


FIG. 2.

FIG. 3.

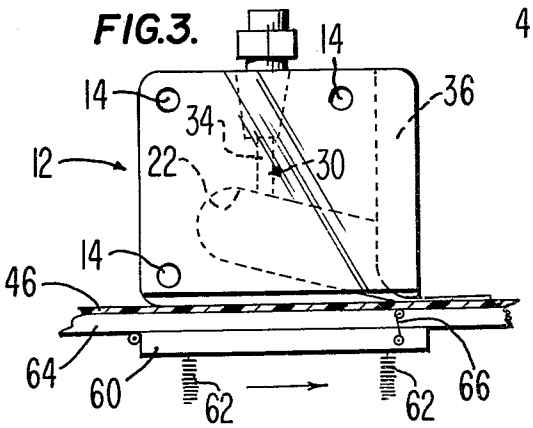


FIG. 4.

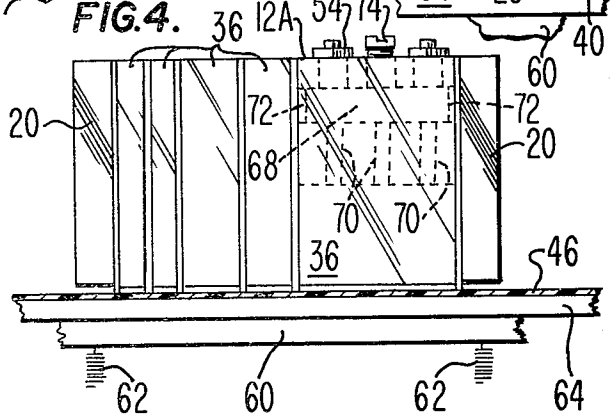


FIG. 5.

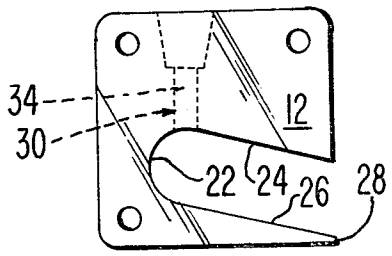


FIG. 6.

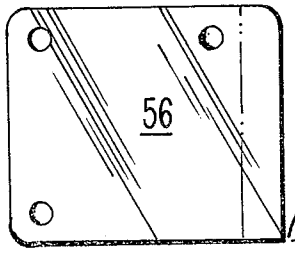
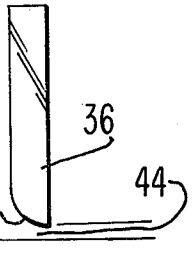


FIG. 7.



MULTIPLE, CONTIGUOUS STRIPE, EXTRUSION COATING APPARATUS

FIELD OF THE INVENTION

This invention relates to apparatus for coating sheets or webs of plastic material with contiguous parallel uniformly planar layers of different material flush with the surface of a support or base material.

PRIOR ART

In order to apply, distribute and meter liquid coatings upon webs or sheets of material, it has been the practice in the past to employ a variety of knives, air knives, bars, blades, aprons, etc., for accurately metering the flow of the coating material as it is applied and distributed by rolls, sprayers, extruders, etc.

When it is desired to coat either different types of material or materials which vary in viscosity and/or color in contiguous parallel stripes with known apparatus the coatings tend to run together. In addition, such coatings are difficult to control with respect to their relative thicknesses and spreadability. The resulting products therefore lack uniform quality and are often unsuitable for their intended purpose.

SUMMARY OF THE INVENTION

The present invention provides a new, novel and heretofore undisclosed apparatus which solves the foregoing problems wherein the metering of the coating material and thus the coating thickness is accomplished via a combination of fluid pressure and a metering device or dam shaped with a radius to provide a lead-in to the line at which the coating thickness is created and an edge which is normal to the direction of travel of the sheets or webs of material. The radius of the dam adjacent to the web insures that agglomerates, etc., will not cause streaks in the coating. Since the normal trailing edge will not become wetted, a smooth coating is produced wherein the thickness thereof is a function of the pressure at the orifice, the gap between the dam and the web or sheet and the speed of the web. The individual orifices are separated from one another by thin flat separators or dividers which separate the individual fluid chambers and provide a wet seal at the web or sheet surface due to the fact that the dividers are wetted at this interface by one or both of the adjoining fluids.

The dividers extend flush with the bottom or web side of the coating apparatus so that there is no penetration of the dividers into the web or sheet. The heights of the orifices need not be the same but may vary as the thickness of the coating may vary. In addition, the feeding pressures of the fluids are independent of one another and can be different thus the coated thickness can be different, within limits, from stripe to stripe or track to track.

Other and further objects and advantages will be apparent from the description which follows taken in conjunction with the accompanying drawing.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is an isometric view of a matrix coating apparatus;

FIG. 2 is a greatly enlarged detail view of a portion of a cavity in a coating head showing an orifice gap and dam;

FIG. 3 is an elevational view of one end of the coating head;

FIG. 4 is a front elevational view of the apparatus of FIG. 1;

FIG. 5 is a detail side elevational view of one of the cavities of the coating apparatus;

FIG. 6 is a side elevational view of a divider used with the invention, and;

FIG. 7 is a side elevational view of the adjustable dam of the invention.

The present invention as described, illustrated and claimed herein, comprises a demountable, separable, multi-part structure which in the preferred embodiment provides an extrusion matrix coating head **10** as seen most clearly in FIG. **1** of the drawing. As shown in FIG. **3**, of the drawing, a plurality of similarly configured, although differently sized, rectangular block-like members **12** are provided with one or more horizontal through holes **14** into which bolts **16** (FIG. **1**) are receivable permitting the members **12** to be stacked together in a matrix assembly. The stacked head members **12** are retained in the matrix assembly, as seen in FIG. **1**, by means of an intermediate frame member **18** and two rigid end frame members **20—20** through which the bolts **16** pass for securement in the usual manner as by nuts on the ends thereof (not shown).

Each of the block-like members **12** although varying in overall size, i.e. width and length, is configured as by milling, molding or cutting to provide a smoothly contoured internal cavity **22** opening outwardly from the internal body portion **12** with the top or roof **24** and the floor or base **26** canted at an angle to the horizontal plane as seen most clearly in FIGS. **1**, **3**, and **5** of the drawing. The leading edge of the lower lip of the orifice or cavity **22** is provided with a sharp, smooth radius **28**, as seen most clearly in FIG. **2**, for purposes to be explained presently.

Each block member **12** is provided with one or more individual coating material inlet orifices **30** which are drilled, milled, cast or molded to include a funnel shaped upper portion **32** which opens into a narrow pipe like opening **34** drilled into the block **12** terminating at the internal rear portion of the roof of the cavity **22**.

A dam member **36**, which is slotted as **38—38**, and shaped to provide an outwardly (rightwardly in FIGS. **1**, **3**, **5**, and **7**) turned radius **40** is vertically, adjustably mounted to the front of the block **12**, partially obstructing the cavity, by means of bolts **42—42**. The vertical adjustment thus provided by each dam **36** permits the gap **44** between the lower radial portion **40** of dam **36** and the member **46** for example, identification card or credit card web material, etc. being coated, to be adjusted for thickness as desired. In addition, the adjustment permits the gap **44** between the dam **36** and the lower radial edge **28** of the bottom of the cavity **22** to be adjusted, i.e. widened or narrowed thereby to control the amount of fluid flowing from the cavity onto the material being coated.

Threaded into the top of each orifice **32** in each block member **12** is a coupling member **50** including a connecting tube or pipe **52** and a nut **54** threadedly retaining the tube to the orifice. Each pipe **52** may be connected either to a junction block so that two or more orifices carrying the same fluid are utilized with a particular coating orifice or connected directly to a supply tank (not shown) of the particular material

being employed for that particular portion of the coating head. As seen in FIG. 1, the inlet orifices and the associated inlet tubes are offset slightly or staggered relative to one another as a means of accommodating the inlets within the available space without interference between adjacent orifices.

Arranged between adjacent pairs of block members 12 is a separator or divider number 56 of thin, flat, sheet like rigid material. The lower edge portion 58 of member 56 is arranged to be flush with the bottom surface of the matrix assembly as seen most clearly in FIG. 4 of the drawing. With this flush arrangement the divider is prevented from penetrating or scoring the web material as the latter passes beneath the coating head. Also, this construction permits the height of the orifice to vary from block to block so as to vary the coating thickness applied to the moving web. The thin flat dividers 56 in separating the different fluid chambers or cavities 22 one from the other provide a wet seal at the interface of the web surface due to the wetting action of the material at this interface by one or both of the adjoining fluid materials. This wet seal produces parallel contiguous tracks or coated areas with straight and precisely located edges not heretofore obtainable with known apparatus.

It is noted that the outlet orifices or cavities 22 may be adjusted to provide different open areas 44 by virtue of the adjustability of the respective dams and in fact different thicknesses of coatings can be accomplished very readily by this means. As seen in FIG. 4, all the orifices are of the same height with respect to the web being coated thus producing a uniform coating thickness along the web of material 46.

As pointed out earlier herein, the present invention contemplates the utilization of multiple coating materials in varying viscosities and layer thicknesses. These materials are or may be applied to the surface of the web of plastic material such for example as the plastic material used to fabricate credit or identification cards, as identified at 46.

Since the plastic material 46 of the web or sheet may vary slightly in thickness from web to web either accidentally or by design requirement and since it is desirable to produce a uniform coating of material on the plastic surface a gimbal mounted backing member 60, vertically spring load by springs 62, is provided. Any surface irregularity or other undulation of the material relative to the coating head 10 is easily accommodated. The backing member 60 is or may be hinged to a supporting frame or table 64 on which the coating head is operably mounted. A latch 66 is adapted to retain the backing member in operable position while enabling the same to be moved away from the coating position for inspection, cleaning, maintenance or repair.

The member 12A is illustrated as being much larger in overall dimensional size than the adjacent members 12. This difference in sizes permits the coating head matrix 10 to be rearranged by stacking the various elements 12 and 12A thereof so as to produce stripes or tracks on the plastic material of different widths. Since member 12A is larger, i.e. wider, than members 12, a manifold 68 is provided therein by drilling horizontally through the member 12A. This permits a more even distribution both of the pressure and of the flow of fluid material into the cavity 22 through the three interconnecting flow holes 70 formed in the body 12A and extending downwardly, vertically, from the manifold opening 68. Opposite ends of the opening 68 are provided with plugs 72—72 while the central down hole is provided with a plug 74.

In the coating of webs such for example as plastic sheet material which is utilized in manufacturing identification and/or credit cards the specific coating width of the various striped areas may vary from job to job. One customer may require that the wide stripe be at the right edge of the card while another may require that the wide stripe be in the middle or at the left edge of the card. Another customer may require only narrow coated stripes or the material may be coated with the widest stripe in the middle without any contiguous stripes at the edge or with a series of narrow stripes on both sides of the wide stripe. The present invention makes it simple, easy and efficient to make up the particular matrix head arrangement which is required for any particular stripe configuration. The operator merely mounts the desired sized head bodies 12 and/or 12A together in a desired configuration with the separator members disposed therebetween as seen in FIG. 4 of the drawing. Thereafter the stacked members 12 and 12A are rigidly bolted together as shown in FIG. 1 and the head matrix assembly is mounted over the floating backup member 60 in operable position for the particular coating task.

What is claimed is:

1. Apparatus, for continuously coating a plurality of stripes on to at least one surface of a sheet member, comprising: at least two rigid block-like members, each said block-like member having upper and lower surfaces, one and other side surfaces and leading and trailing surfaces, each said block-like member having an opening therein which extends from said one side surface and along said trailing surface to said other side surface so as to form first and second apertures in said one and other side surfaces, respectively, and a third aperture in said trailing surface, said opening also extending from said third aperture angularly upward toward said upper and leading surfaces, said trailing surface including a generally convex surface portion extending from said lower surface to said third aperture, said convex surface portion also extending from said first aperture and along said trailing surface to said second aperture, said convex surface portion forming a lip at said third aperture, each block-like member also including at least one hole therein which extends from said upper surface to said opening and providing communication between said upper surface and said opening, each said hole being adapted for enabling coating material to enter said hole at said upper surface, enter said opening from said communicating hole and become discharged from said opening over said lip at said third aperture; at least one relatively thin separator member located between each two of said block-like members so as to close said second and first apertures of said one and other side surfaces of said two block-like members, respectively, and to separate coating material in the opening of one block-like member from coating material in the opening of the other of said two block-like members, each said separator member also having an edge surface which is substantially flush with at least said lower surfaces of said two block-like members; at least two rigid end frame members between which said at least two block-like member and intermediate separator member are secured, said first and second apertures of said one and other side surfaces of

said two block-like members, respectively, being closed by one and the other, respectively, of said end frame members; at least two rigid block-like dam members, each having upper and lower surfaces, one and other side surfaces and leading and trailing surfaces, each dam member being associated with a different block-like member such that the leading surface of a dam member abuts a trailing surface of a block-like member, each dam member including a generally convex surface portion between its lower surface and its leading surface, the convex surface portions of each block-like member and each dam member associated therewith being spaced-apart to define a gap through which the coating material may be discharged from said opening in said block-like member, said convex surface portion of said dam member extending for a short distance beyond said gap and lip in a direction away from the trailing surface of said block-like member and toward the trailing surface of said dam member; means associated with each dam member and the block-like member associated with said dam member for adjusting the vertical position of said dam member relative to said associated block-like member so that the size of said gap may be selectively varied; a backing member mounted beneath the lower surfaces and flush edge surfaces of said block-like members and separator members, respectively, and spaced-apart from said surfaces by a distance to form a passage sufficient to receive said sheet to be coated so that said sheet is sandwiched between said backing member and said lower surfaces and flush edge surfaces of said block-like members and said separator members, respectively, said sheet being slidable in a direction from said leading surfaces toward said trailing surfaces so that coating materials from each said opening may discharge through said gaps as well as under said extending convex portions of said dam members on to a surface of said sheet in order to form stripes of said coating materials on said surface of said sheet as said sheet is slidably moved, said separator members enabling the discharging coating materials from said openings to form wet seals thereat on said sheet and parallel, stripes of said materials on said sheet so that each said stripe have straight edges; and a support member for said backing member.

2. The apparatus set forth in claim **1** wherein said edge surfaces of said separator members enable the discharging coating materials to form wet seals between said stripes, said stripes being in parallel, contiguous relationship.

3. The apparatus set forth in claim **1** further comprising gimbal-mounting means for said backing member, means for spring-loading said support member, hinge means for said support member and latch means for securing said backing and support members against relative movement.

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