Aug. 31, 1965 L. F. HANSEN ETAL 3,203,347

ROTARY PIGMENT PRINTER FOR GELATIN STRIP FOR CAPSULES

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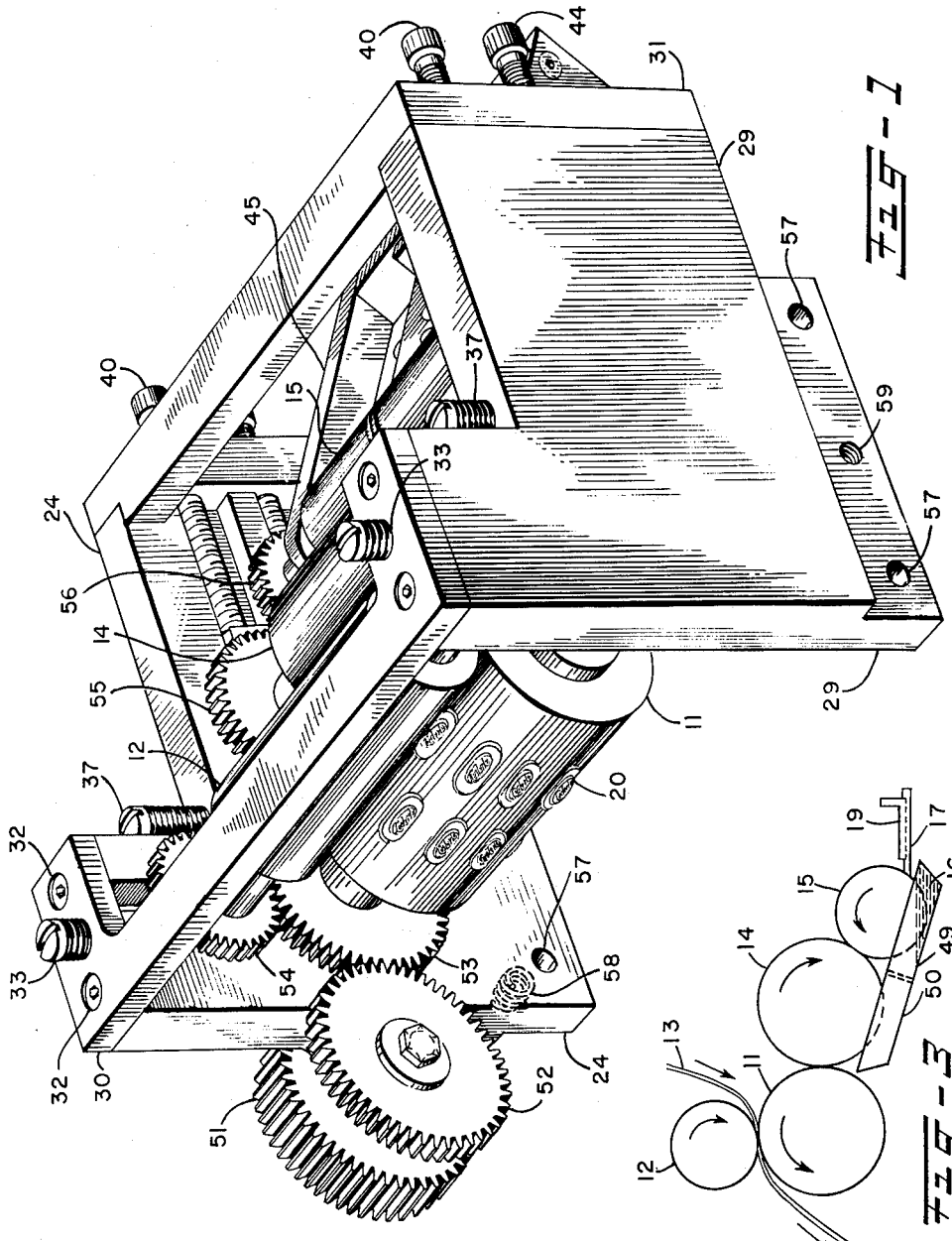


FIG. 1

FIG. 3

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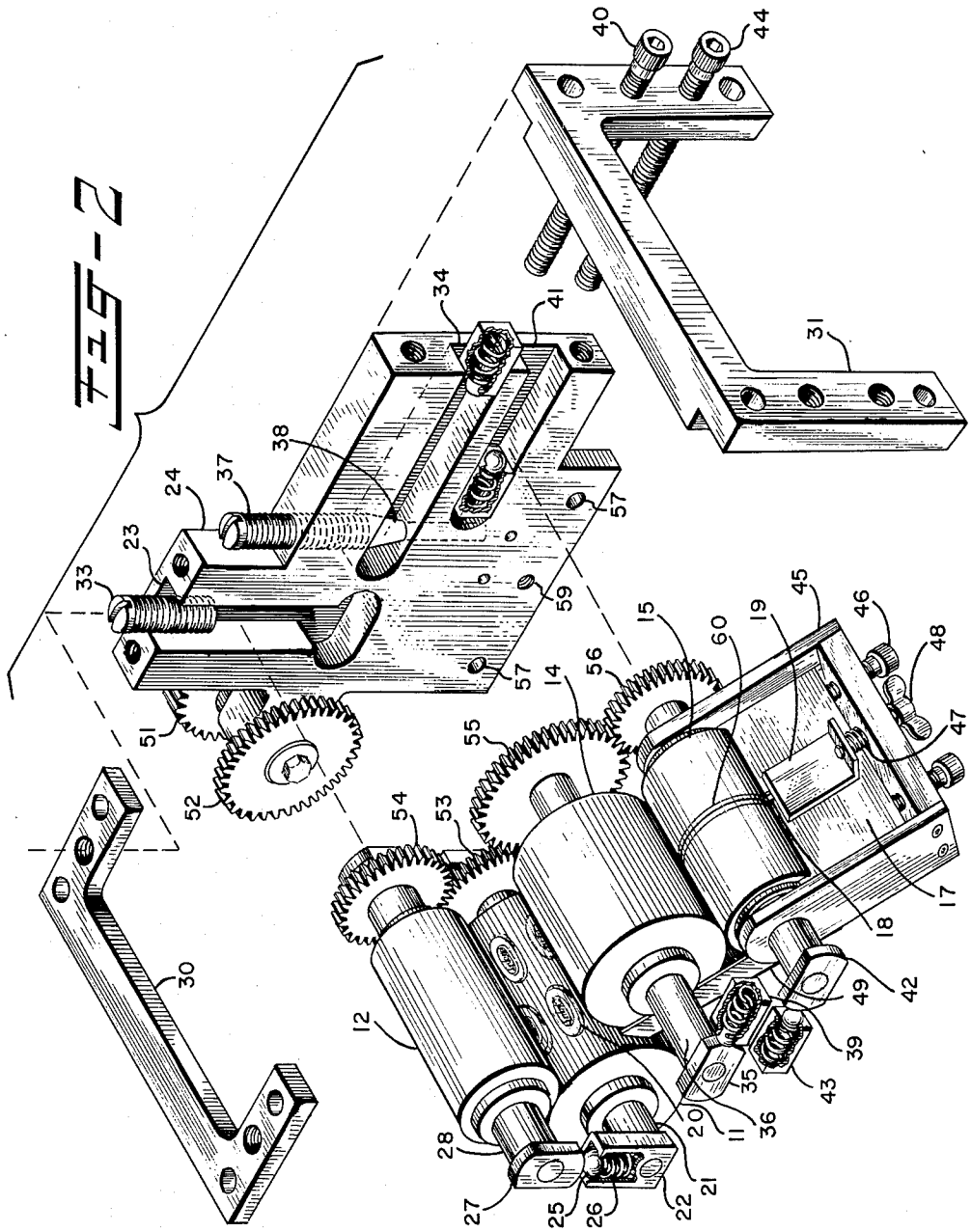
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FIG-2



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United States Patent Office

3,203,347

Patented Aug. 31, 1965

3,203,347

ROTARY PIGMENT PRINTER FOR GELATIN STRIP FOR CAPSULES

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Filed June 14, 1963, Ser. No. 287,842
3 Claims. (Cl. 101—219)

This invention relates to a pigment printer in which a plastic strip, usually a gelatin composition, is passed between a marking roll and a pressure roll with the pigment marking fluid being fed through a notched doctor to a pigment pick-up roll and which is then transferred and spread to a transfer and spreading roll, from which it is transferred to the pressure roll. By scraping off all of the pigment except for a narrow strip, the rate of feed is more readily adjusted and caking is reduced.

Because all of the pigmented marking fluid is scraped from the pigment pick-up roll except for a narrow strip, the volume feed is a function of the size of the narrow ribbon of pigment marking fluid. Because all of the residual film is scraped from the pick-up roll except for the narrow ribbon, the viscosity and hence the transfer characteristics from the pigment pick-up to the transfer and spreading roll are not as critical as in conventional ink feed systems for letter press printing. Thus the rate of pigment deposition and intensity of print is readily controlled and remains stable. Further, drying of the marking fluid and hence caking is reduced to a minimum. With more conventional systems, such as are used for feeding conventional inks, pigment printers require constant attention and even with constant attention a smooth uniform print frequently cannot be obtained.

In marking soft gelatin capsules, compositions have been used for marking on the surface of a gelatin strip with a dye before the strip is formed into capsules. One such embodiment is described in United States Patent 2,624,163, F. E. Stirn, Method of Making Colored Gelatin Capsules, January 6, 1953. A different marking composition is described in United States Patent 2,821,821 E. C. Yen, Marking Gelatin Capsules, February 4, 1958. A machine for applying marking fluid to strip gelatin to be used for making capsules is described in United States Patent 2,929,320, L. F. Hansen and R. Glorig, Machine for Marking Capsules, March 22, 1960.

The capsules themselves may be formed on a machine such as described in United States Patent 2,775,080, Stirn and Taylor, Method of Filling Powder-and-Liquid Filled Capsules, December 25, 1956, or United States Patent 2,697,317, Stirn and Taylor, Capsule Forming Die Roll, December 21, 1954.

The present pigment printer may be used with such machines or with other machines for forming capsules from plastic strip. Because gelatin-glycerine-water compositions meet with the greatest commercial acceptance, the invention is further described with particular reference to gelatin strip.

Dyes are conveniently used to mark on the surface of light-colored capsules but where the main body of the capsule itself is dark, a dye which has additional color is difficult to read and a sufficiently heavy dye impression may result in bleeding.

A new development in identification of capsules is marking of the capsules first on a colorless or white capsule and then surface dyeing the capsule with the marking showing through the surface coloring. For such a procedure, particularly if the capsule is to be colored a dark color, dyes give a dim impression. In the past, the use of pigments for surface marking has not been practical because of difficulties in commercial marking, including

adhesion, pigment transfer, offsetting, chipping of the pigment and lack of a pigment printer which would mark without constant attention.

A soft gelatin strip before the capsules are made, must have a considerable portion of glycerine and water so that good sealing is obtained. After the capsules have been manufactured by cutting out the capsules from the gelatin strips the strips are still quite tender. To permit handling of the capsules after manufacture and before dyeing, it is necessary that the marking composition rapidly permeate and become affixed to the gelatin strip so that the marking does not unduly offset or bleed. If the capsules thus marked are to be additionally dyed, the marking must be compatible with the later dyeing composition. It is easy to find a composition which will have some of the desired attributes but a commercially-satisfactory pigment composition is more difficult to prepare. Because the dyes usually used for marking are soluble in a polyhydric alcohol-water system, a dye system used for marking easily penetrates and leaves the dye in the surface of the film, so that no dripping problem is involved. Additionally, dyes are soluble, and hence redissolve in the solvent system of choice and hence do not cake on the printing unit. Pigments are already solid particles, and hence remain on the surface of the capsule, and are more apt to chip off or offset, and are not readily resuspendable, and hence clog the printing unit.

An excellent marking composition consists of a suspension of a substantially water-insoluble non-toxic opaque material such as titanium dioxide, calcium carbonate or barium sulfate suspended in an aqueous vehicle containing a polyhydric alcohol such as glycerine, propylene glycol, ethylene glycol, or polyethylene glycol with a small amount of a non-toxic surface active agent to maintain the pigment in suspension and a water-soluble suspending and adhesive agent such as methyl cellulose. Titanium dioxide is the strongest and usually preferred pigment.

The scope of the present invention is set forth in the claims. One embodiment thereof is shown in the accompanying drawings, in which:

FIGURE 1 is a pictorial view of the assembled pigment printer.

FIGURE 2 is a pictorial exploded view of the pigment printer.

FIGURE 3 is a diagrammatic cross section of the roll system of the pigment printer.

As shown in FIGURE 3, the essential elements of the pigment printer include a marking roll **11**, which corresponds to the printing roll of the more conventional printing couples; and adjacent thereto a pressure roll **12**. Between these two rolls passes the gelatin strip **13**. Adjacent to the marking roll **11**, and bearing against raised portions of the marking roll, is the pigment marking fluid transfer and spreading roll **14**, sometimes hereafter shortened to the transfer roll. In contact with the transfer roll is the pigment pick-up roll **15**. The pigment pick-up roll, which rotates in the pigment marking fluid **16**, bears against the transfer roll **14** and a notched doctor blade **17** doctors or scrapes the pigment marking fluid from the pigment pick-up roll except at the notch **18**. The cross section of the notch is varied by the notch adjusting doctor **19**.

Thus, a very narrow band of pigment marking fluid of adjustable cross section passes through the notch in the notched doctor blade and is spread over the surface of the transfer and spreading roll **14** as the pigment fluid passes between the bite of the transfer and spreading roll and the pigment pick-up roll, thus giving a uniform coating on the transfer and spreading roll which is transferred to the raised portions of the marking roll and thus to the gelatin strip being marked.

As shown in more detail in FIGURE 2, the marking

roll 11 consists of a roll having integral or separate marking type 20 which are conveniently trademark or identification cuts having the design, indicia or letters to be printed on a soft gelatin strip 13. The marking roll 11 is mounted on the marking roll shaft 21 which is journaled at each end in a marking roll journal block 22. The rear marking roll journal block 22 slides in the marking roll slot 23 in the rear side plate 24. The marking roll journal block 22 has in its upper face a positioning ball 25 under which is a positioning ball spring 26.

Also sliding in the marking roll slot 23 is the pressure roll journal block 27. In the pressure roll journal block is journaled the pressure roll shaft 28 on which is mounted the pressure roll 12.

A corresponding front side plate 29 is on the front side of the assembly and of the same general configuration, except for the driven gear support. Both side plates are shown in FIGURE 1. The front side plate is omitted in FIGURE 2 to show the details of roll construction. The front and rear side plates are held apart by a top side plate spacer 30 and an end side plate spacer 31. The spacers are held to the side plates by spacer cap screws 32. Through the top side plate spacer extends a pressure roll adjusting screw 33 which bears on the pressure roll journal block 27 pressing the pressure roll towards the marking roll. The positioning ball 25 loaded by the positioning ball spring 26 tends to press the pressure and marking rolls apart, thus taking up any lost motion and permitting a very delicate adjustment of the spacing between the pressure roll 12 and the marking roll 11. Thus the pressure on the gelatin strip 13 passing therebetween is readily and accurately controlled. It is necessary that only minimum pressure be used as the gelatin strip is tender and easily damaged by pressure.

The side plates have therein, at approximately right angles to the marking roll slot 23, transfer roll slots 34, in which slides the transfer roll journal blocks 35 in which blocks is journaled the transfer roll shaft 36. At the end of the transfer roll slots, closest to the pressure roll, are conical tapered positioning screws 37. The transfer roll journaled blocks 35 bear against the conical portions 38 of the positioning screws 37 and hence the entry depth of these blocks and the pressure between the transfer roll and the marking roll can be accurately controlled. Bearing against the transfer roll journal blocks are transfer roll balls and springs 39 which are compressed to increase pressure by transfer roll adjusting screws 40 threaded in the end side plate spacer 31.

Partially under and adjacent to, and conveniently parallel to, the transfer roll slots 34 are pigment pick-up roll slots 41 in which slots slide the pigment pick-up journal blocks 42, which in turn are urged backwards by the pick-up roll balls and springs 43 and which are pressed forward by the pick-up roll adjusting screws 44. The shaft of the pick-up roll 15 is journaled in said blocks 42. The spring loading of the blocks thus permits the use of the adjusting screws to give delicate control over pressures and any lost motion is taken up by spring action. The action of the journal blocks and adjusting assemblies are the same for both side plates.

Also journaled on the shaft of the pigment pick-up roll 15 is a doctor blade frame 45. In this doctor blade frame slides a notched doctor blade 17 which is held against the pigment pick-up roll 15 by the notched doctor adjusting screws 46. A notch adjusting doctor 19 slides on the surface of the notched doctor blade 17 and is urged towards the pigment pick-up roll by a biasing spring 47 and held open by a feed-adjusting screw 48.

Under the pigment pick-up roll 15 is a pigment marking fluid trough 49 holding marking fluid 16. Also in the trough is a spillage compartment 50 to pick up any marking fluid which is spilt during operation. A conventional fluid supply system is used to supply the pigment marking fluid to a constant level in the pigment marking fluid trough.

As shown in FIGURE 1, the shaft of each roll is gear driven. On the rear side plate only is mounted a wide driven gear 51 which is driven by an angularly adjustable gear on the encapsulation machine, the details of which are conventional. This is a spur gear which is wide enough so that the entire pigment marker assembly can be axially shifted for lateral register. An angularly adjustable drive gear on the encapsulating machine provides for linear register. The wide driven gear is fastened to a spur gear 52 which in turn drives the marking roll gear 53 which drives the pressure roll gear 54, and the transfer roll gear 55, which transfer roll gear drives the pigment pick-up roll gear 56.

In the lower part of the side plates are mounting holes 57 which permit the entire assembly to slide on mounting rods attached to the encapsulation machine so that the entire assembly may be axially adjusted for lateral register. Conveniently, the assembly is spring loaded in one direction by mounting springs 58 behind the assembly which is held against the spring action by an adjusting screw setting through an adjusting screw hole 59.

In operation the pigment printer assembly is mounted on the encapsulation machine so that the gelatin strip feeds between the marking roll 11 and the pressure roll 12 and the marking fluid composition is fed in to the pigment fluid trough. The pigment fluid is picked up by the pigment pick-up roll. Most of the fluid is scraped off of the pigment pick-up roll by the notched doctor so that only a narrow ribbon of pigment marking fluid 60 is fed on the surface of the pigment pick-up roll and into the bite between the pigment pick-up roll and the transfer and spreading roll. Because this ribbon is comparatively narrow, about 2 mm., the volume may be more readily controlled than if a wider feed were used. Thus, the amount of pigment marking fluid fed can be exactly adjusted to a desired rate so that as the fluid is evenly spread over the surface of the transfer and spreading roll, just enough is fed to properly mark the gelatin strip.

The present pigment marker can be used with soluble dye compositions such as are disclosed in United States Patent 2,821,821, supra, as well as pigment marking compositions. However, the marking machines such as disclosed in United States Patent 2,929,320, supra, which are satisfactory for soluble dye marking compositions do not feed sufficiently uniformly to give economical results with the present pigment marking fluids. If the marking fluid evaporates too rapidly the marking roll becomes caked and if it evaporates too slowly the marked capsules are damaged by offset or smearing. The exact rate of feed of the pigment marking fluid is critical as it must be sufficiently heavy to give an adequate print and yet not so heavy as to flake off from the finished capsules or remain in such a mass as to be slow drying; hence the unique cooperation between the above described marking apparatus and the marking fluid composition.

Although the material of construction is not critical for effective results, the pigment printer has a longer effective life if the pick-up roll is of a hard material such as stainless steel, or chrome-plated steel, and the pressure roll and transfer and spreading roll are of a resilient material, such as rubber or a synthetic rubber, which is not swelled by the pigment marking fluid.

The pigment printer thus described also gives good results with a pigment marking fluid containing both a soluble dye and a pigment.

We claim:

1. In a machine for marking plastic strip from which soft plastic capsules are to be formed comprising a frame assembly having slots therein in which the rolls are adjustable and having a marking roll and a pressure roll between which the plastic strip passes, the improvement comprising the combination therewith of: a transfer and spreading roll in marking fluid transferring relationship with the marking roll, and a pigment marking fluid pick-up roll in marking fluid spreading and transferring re-

lationship with said transfer and spreading roll, a notched doctor bearing on said pick-up roll to scrape clean said roll except for a narrow ribbon of pigmented marking fluid, means to adjust the cross-sectional area of said narrow ribbon of pigmented marking fluid, and gear drive means for all of said rolls, whereby a pigmented marking fluid is adjustably metered by passing through the notch in said notched doctor blade and uniformly spread between said pick-up marking roll and the transfer and spreading roll to give a uniform and consistent rate of feed to the transfer and spreading roll and therefrom to the marking roll over a wide range of viscosity characteristics of the pigmented marking fluid.

2. A method of uniformly feeding a pigmented marking fluid to a marking roll which prints on a soft plastic strip comprising: passing a narrow ribbon of pigment marking fluid on the surface of a pigment pick-up roll to a line of tangency between said pick-up roll and a transfer and spreading roll, smoothly and uniformly spreading said

narrow ribbon of pigment marking fluid over the surfaces of both said transfer and spreading roll and said pigment pick-up roll, thereby transferring a uniform marking quantity of said pigmented marking fluid from said transfer and spreading roll to raised areas on the marking roll, and passing plastic strip backed by a pressure roll into contact with the pigment marking fluid coated raised portions of said marking roll, thereby uniformly and consistently pigment marking selected portions of a plastic strip from which capsules are to be formed.

3. The method of claim **2** in which the soft plastic strip is a soft gelatin strip.

References Cited by the Examiner

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WILLIAM B. PENN, *Primary Examiner.*