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Marozzi et al.

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[45] **Apr. 16, 1974**

[54] **YIELDABLY MOUNTED SEALABLE INK CARTRIDGE AND PRINT HEAD**

[75] Inventors: **Alfred A. Marozzi**, Upper Montclair; **Joseph Fuzia**, Nutley, both of N.J.

[73] Assignee: **Bell-Mark Corporation**, Bloomfield, N.J. ; by said Fuzia

[22] Filed: **Jan. 17, 1972**

[21] Appl. No.: **218,334**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 170,916, Aug. 11, 1971.

[52] **U.S. Cl.** **101/333**, 101/104, 101/334, 101/335

[51] **Int. Cl.** **B41k 1/42**

[58] **Field of Search** ..... 101/333, 334, 103, 104, 101/310, 316, 83, 97, 91, 101, 108, 291, 301, 310, 324, 327, 335, 366, 416 A; 401/199

[56] **References Cited**

UNITED STATES PATENTS

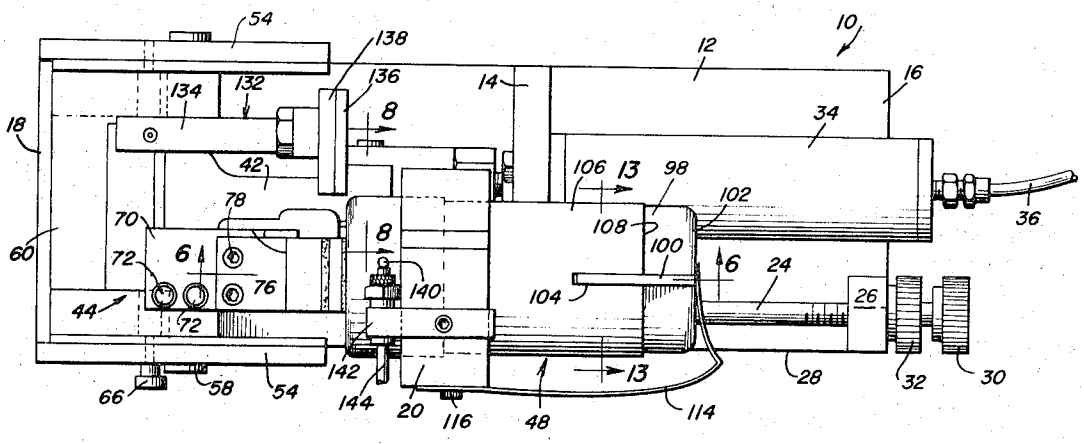
1,834,147	12/1931	Dausman	101/416 A
3,355,239	11/1967	Albrecht	401/199 UX
3,364,856	1/1968	Lind	101/334
3,369,543	2/1968	Ronco	401/199 UX
3,543,681	12/1970	Klenz	101/44
3,115,826	12/1963	Reinhardt et al.	101/334 X
3,085,506	4/1963	Worth	101/334
3,307,479	3/1967	Messmer	101/334
2,950,676	8/1960	Weissman et al.	101/405 UX
3,215,073	11/1965	Robinson	101/333
3,599,566	8/1971	Fish	101/364 X
2,252,649	8/1941	Smallman	101/333
1,401,436	12/1921	Pannier	101/105
2,819,668	1/1958	McAneny	101/405 X

Primary Examiner—Robert E. Pulfrey
Assistant Examiner—R. E. Suter
Attorney, Agent, or Firm—Clarence A. O'Brien; Harvey B. Jacobson

[57] **ABSTRACT**

An ink saturated pad in a replaceable ink supply cartridge is momentarily exposed through a restricted opening in a cartridge closure element while a surface is being marked by a print head in a marking position to which it is intermittently displaced. The print head in its rest position contacts the cartridge closure element with an adjusted pressure to effect a regulated pumping action for maintaining the ink pad saturated.

2 Claims, 13 Drawing Figures



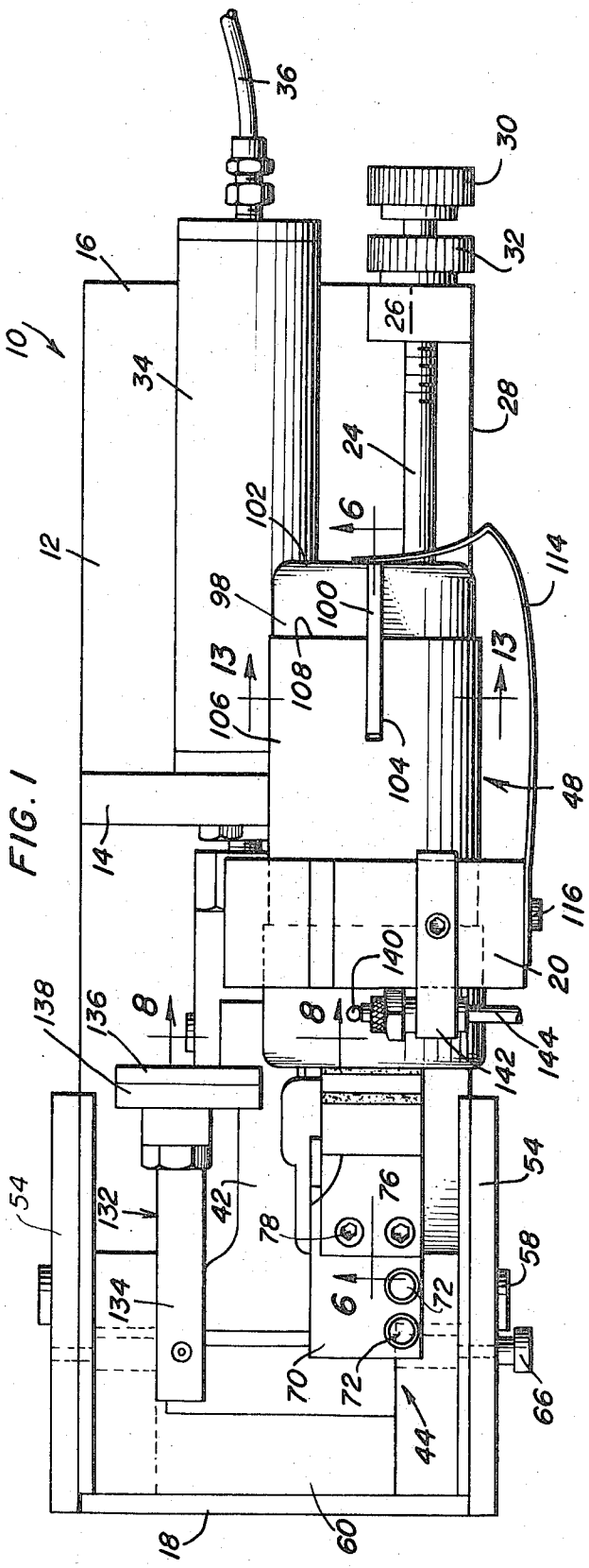


FIG. 1

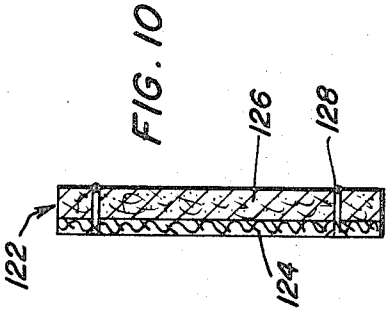


FIG. 10

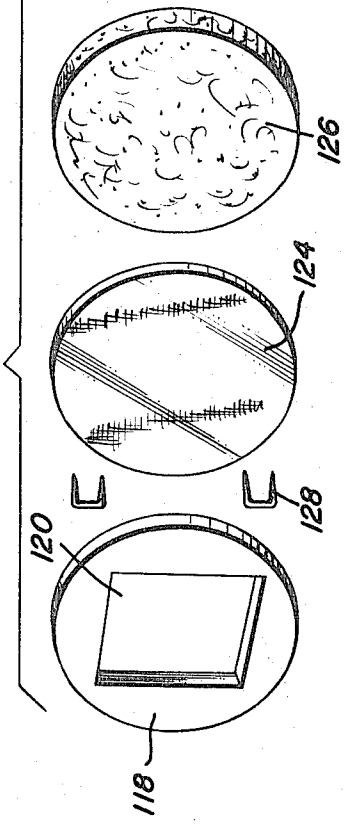


FIG 9

FIG. 3

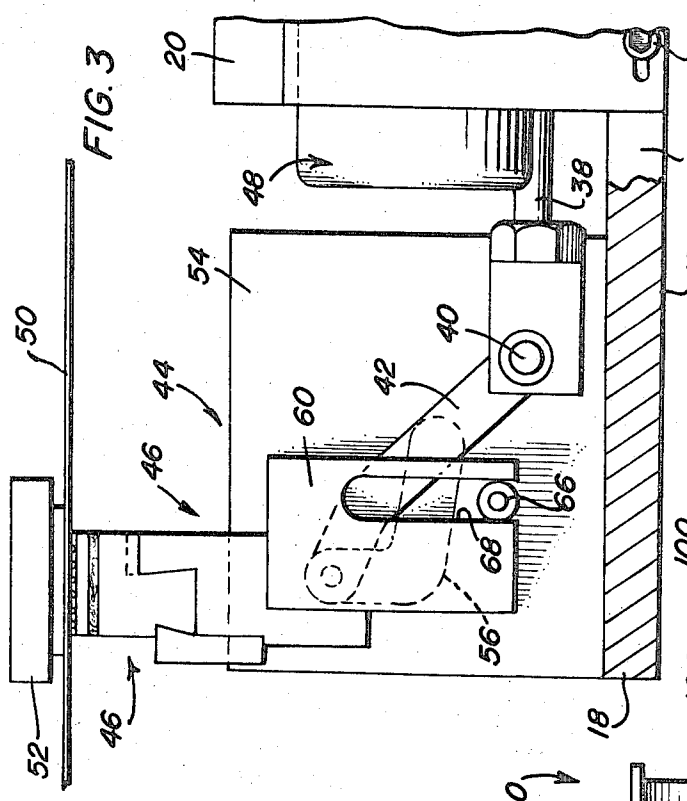
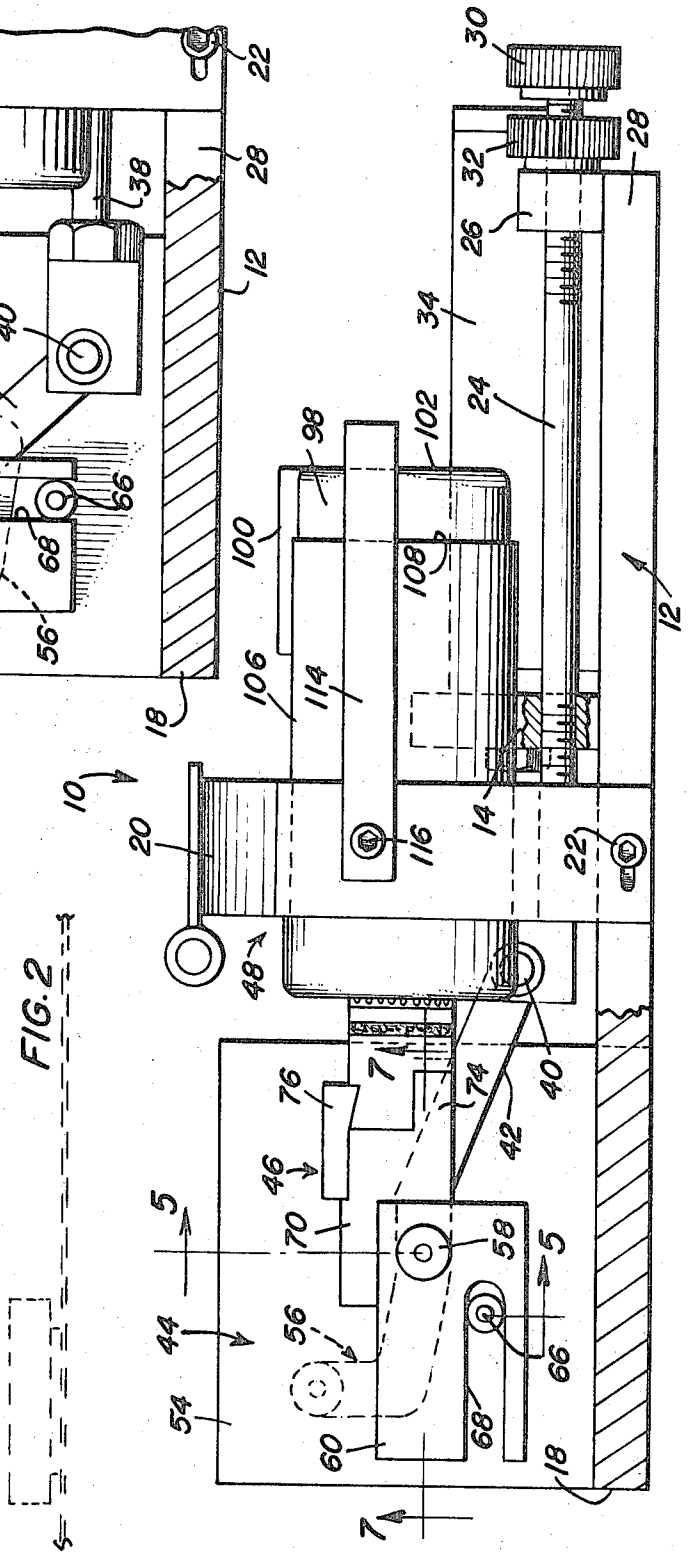

20
22
48
38
28
12
54
50
40
42
44
60
46
66
68
56
52
18

FIG. 2


30
32
28
26
34
24
98
102
100
108
12
106
114
10
20
14
116
22
48
40
74
76
42
46
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44
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66
54
68
60
18
7

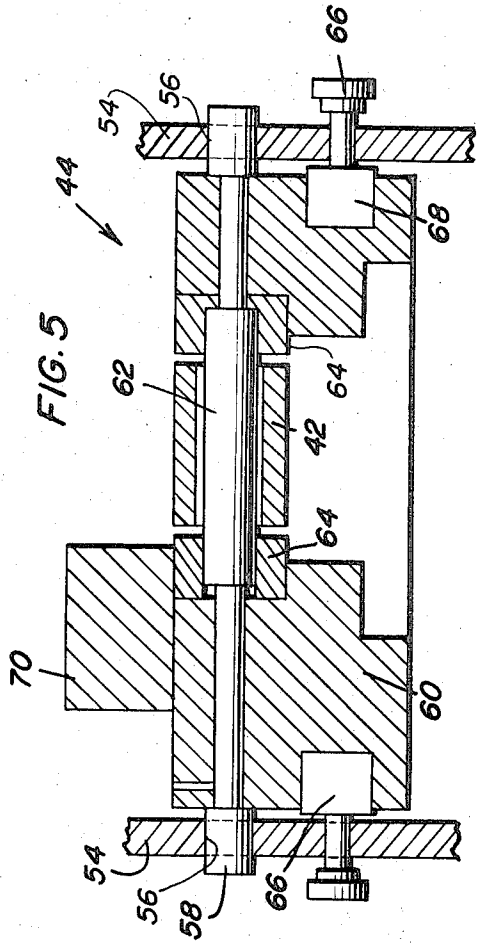


FIG. 5

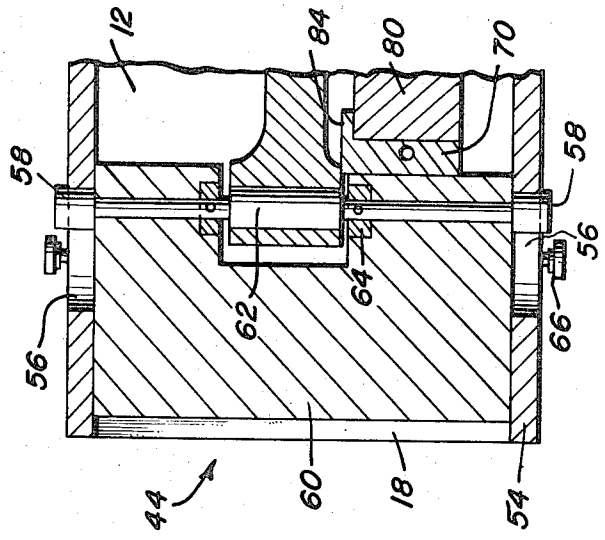


FIG. 7

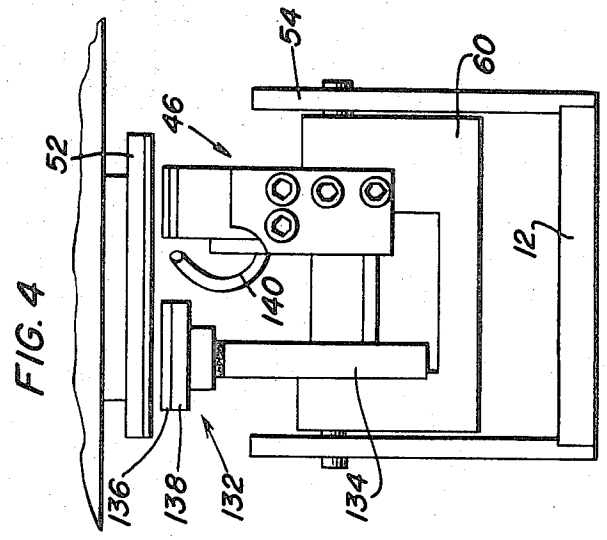


FIG. 4

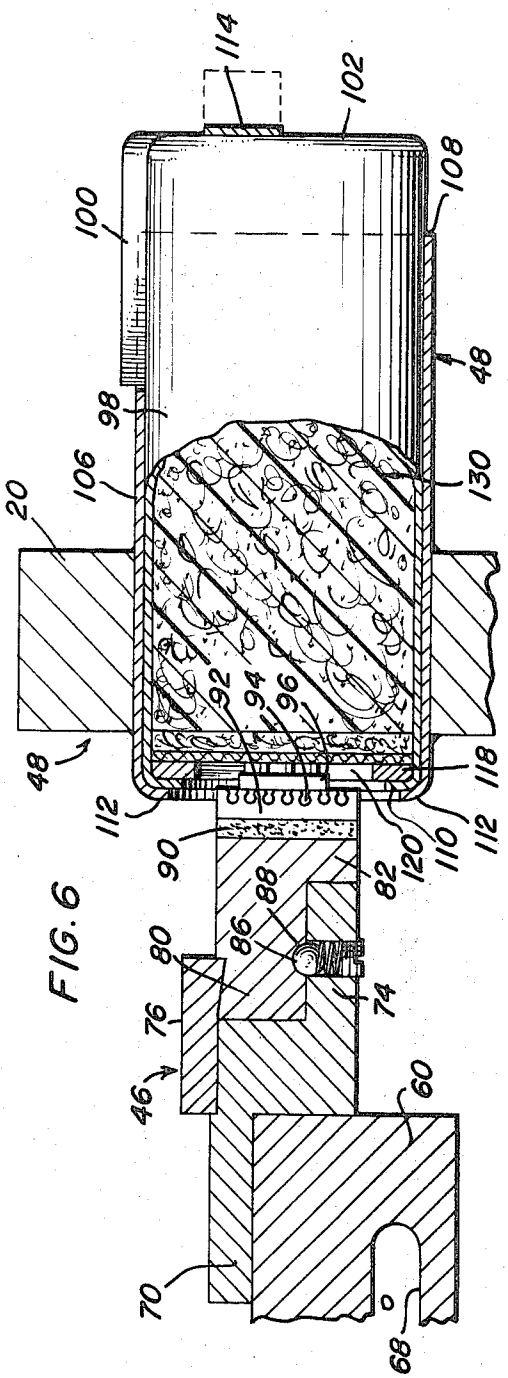


FIG. 6

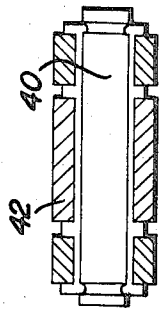


FIG. 8

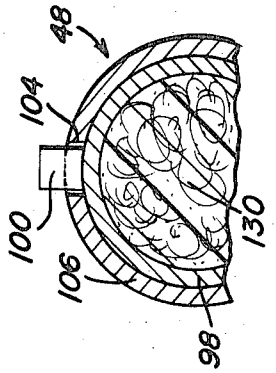


FIG. 13

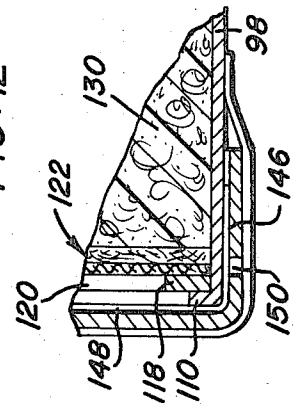


FIG. 12

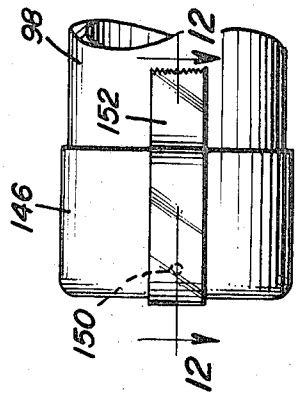


FIG. 11

YIELDABLY MOUNTED SEALABLE INK CARTRIDGE AND PRINT HEAD

This invention relates to an ink marking apparatus embodying certain improvements over the apparatus disclosed in prior copending application, U. S. Ser. No. 170,916, filed Aug. 11, 1971, with respect to which the present application is a continuation-in-part.

The present invention relates to apparatus for marking surfaces on absorbent or non-absorbent material such as packaging webs, cartons and various mass-produced packaged products. Marking apparatus for packaging machines, conveyors or processing equipment, has heretofore required frequent maintenance under continuous use and a time-consuming ink replacement procedure. Further, the use of a fast drying ink for such apparatus was not practicable because of the frequency with which ink replacement was required. It is therefore an important object of the present invention to provide ink marking apparatus for packaging equipment that requires significantly less maintenance and utilizes a fast drying ink for quality imprints on absorbent or non-absorbent material surfaces. A further object is to provide a marking apparatus utilizing a replaceable ink cartridge storing a fast drying ink.

In accordance with the present invention, the ink marking apparatus includes a print head easily assembled on a holder that is mounted by a pivot block for displacement between two angularly spaced positions by means of a signal controlled fluid operated device. The print head is thereby intermittently displaced from a rest position to a marking position in which it contacts the surface to be imprinted. In the rest position, the print head is positioned in contact with the apertured closure of an ink storing cartridge so as to seal the cartridge while the print head is being coated with ink from an ink saturated pad in the cartridge that is only momentarily exposed to air through the opening in the closure while the print head is being displaced to and from its marking position. The cartridge is yieldably held in an adjusted position in a frame mounted sleeve for establishing a desired contact pressure between the print head in its rest position and the apertured closure for efficient transfer of ink to the print head. The ink is stored within an abosrbent filler within the cartridge held compressed against the pad by a spacer at the closed end of the cartridge as described in my prior copending application aforementioned. The ink cartridge is pre-inked and stored in a sealed condition by use of a storage cap on the open end through which the ink saturated pad is exposed.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts through-out, and in which:

FIG. 1 is a top plan view of ink marking apparatus constructed in accordance with the present invention.

FIG. 2 is a side elevational view of the apparatus with parts broken away and shown in section.

FIG. 3 is a partial side elevational view of the apparatus illustrated in a different operational condition than that shown in FIG. 2.

FIG. 4 is an end view of the apparatus in the position corresponding to FIG. 3.

FIG. 5 is a transverse sectional view taken substantially through a plane indicated by section line 5—5 in FIG. 2.

FIG. 6 is an enlarged partial sectional view taken substantially through a plane indicated by section line 6—6 in FIG. 1.

FIG. 7 is an enlarged partial sectional view taken substantially through a plane indicated by section line 7—7 in FIG. 2.

FIG. 8 is a partial sectional view taken substantially through a plane indicated by section line 8—8 in FIG. 1.

FIG. 9 is a perspective view of certain disassembled parts of the ink cartridge.

FIG. 10 is a side sectional view through the ink saturated pad assembly in the ink cartridge.

FIG. 11 is a partial side elevational view of an ink cartridge in a storage condition.

FIG. 12 is an enlarged partial sectional view taken substantially through a plane indicated by section line 12—12 in FIG. 11.

FIG. 13 is a transverse sectional view taken substantially through a plane indicated by section line 13—13 in FIG. 1.

Referring now to the drawings in detail and initially to FIGS. 1 and 2, the apparatus of the present invention generally referred to by reference numeral 10 includes a base portion 12 on which a transverse mounting block 14 is fixedly mounted between opposite longitudinal ends 16 and 18 of the base. A frame member 20 is also mounted on the base in a longitudinally adjusted position at which it may be locked by a screw fastener 22 as shown in FIG. 2. A threaded adjustment rod 24 is accordingly connected to the frame member 20 snd threaded through the mounting block 14. The adjustment rod 24 extends through a bearing block 26 secured to the end 16 of the base at one longitudinal side edge 28. An adjustment knob 30 is connected to the end of the rod 24. A lock nut 32 is also threadedly mounted on the rod and bears against the block 26 for locking the rod 24 in a longitudinally adjusted position.

The mounting block 14 also mounts the forward end of an air cylinder 34 as more clearly seen in FIG. 1. Air under pressure is supplied to the rear end of the cylinder from any suitable source through a conduit 36 in order to cause projection of a piston rod 38 as shown in FIG. 3 from the forward end of the cylinder in response to an actuating signal applied in a manner well known to those skilled in the art, after which the piston rod is promptly retracted to the position shown in FIGS. 1 and 2. The forward end of the piston rod 38 is connected by means of a pivot 40 and actuating arm 42 to a print head displacing mechanism generally referred to by reference numeral 44.

The print head displacing mechanism 44 carries a print head assembly generally referred to by reference numeral 46 that is displaced from a horizontally extending rest position shown in FIGS. 1 and 2 to a vertically extending marking position as shown in FIGS. 3 and 4. In the rest position, the print head assembly 46 is in contact with an ink storing cartridge generally referred to by reference numeral 48 while in the marking position, the print head contacts a printed surface such as the web 50 backed by a platen 52 as shown in FIG.

3. As hereinbefore indicated, the print head is adapted to be intermittently displaced to the marking position by means of the air cylinder device **34.** Only then, is there momentary exposure of the ink within the cartridge **48** to air because in the rest position of the print head **46,** as shown in FIG. **2,** the ink is sealed within the cartridge by the print head assembly as will be hereafter explained in detail, in order to prevent drying of the ink.

Referring now to FIGS. **1, 2, 5** and **7,** the print head displacing mechanism **44** is mounted adjacent the end **18** on the base and includes a pair of parallel spaced guide plates **54** within which aligned guide slots **56** are formed. The guide slots **56** include two angularly related track portions within which pivot pins **58** are slidably displaceable in order to guide movement of a carrier or block **60** from which the pivot pins extend laterally. Thus, the two portions of the guide slots form a path constraining movement of the print head for initial retraction from the rest position and subsequent angular displacement toward the marking position. The pivot pins **58** are end formations on a pivot shaft **62** mounted by the carrier block **60** as more clearly seen in FIGS. **5** and **7,** by means of which the actuating arm **42** is pivotally connected to the block between the spacers **64.** Accordingly, movement is imparted to the block upon extension of the piston rod **38** which is pivotally connected by pivot **40** to the actuating arm **42.** Movement of the carrier block is guided and limited by the guide slots **56** and is constrained by fixed bearings **66** mounted by the guide plates **54** and received within bearing slots **68** formed in the block.

Displacement of the carrier block **60** between the two limit positions as shown in FIGS. **2** and **3** respectively, carries the print head assembly **46** between the rest and marking positions as aforementioned. The print head assembly includes a holder **70** as more clearly seen in FIG. **6** which is secured by means of a pair of fasteners **72** to the pivot block **60** as more clearly seen in FIG. **1.** A mounting slot is formed at the forward end of the holder **70** between a projecting leg portion **74** and a removable plate member **76** secured to the holder by a pair of fasteners **78** as shown in FIG. **1.** The slot formed between the leg portion **74** of the holder and the plate element **76** laterally receives a tongue portion **80** projecting rearwardly from a print head **82.** The tongue portion **80** of the print head is adapted to abut a lateral extension **84** (FIG. **7**) of the leg portion **74** and is yieldably held in position by means of a ball detent **86** mounted by the leg portion **74** and received within a recess **88** as shown in FIG. **6.** The forward end of the print head **82** is cemented to a foam spacer **90** to which a base lock mat **92** is cemented. A cement or glue **94** on the forward surface of the mat **92** holds the type **96** which projects into the ink cartridge **48** in the rest position of the print head assembly as shown in FIG. **6.**

The ink cartridge **48** includes a cylindrical housing **98** from which a key element **100** projects upwardly and extends along a longitudinal portion thereof from the closed end **102** as shown in FIGS. **1, 2, 6** and **13.** The key element **100** is received within a slot **104** formed in a sleeve **106** fixed to the frame member **20.** Thus, the cartridge housing **98** is readily inserted into the rear end **108** of the sleeve and prevented from rotation relative thereto by means of the key element **100** received in the slot **104.** A yieldable means in the form of spring element **114** yieldably holds the forward open end **110** of the cartridge housing **98** as shown in FIG. **6** in abutment with the stop formation or annular flange portion **112** of the sleeve **106.** The spring element **114** is anchored to the frame member **20** by means of a fastener **116.** Thus, the print head engages the forward end of the ink cartridge with a contact pressure resisted by the regulating bias of spring element **114,** the contact pressure being varied by adjusting the position of the frame member **20** by means of the adjustment rod **24** as aforementioned.

The print head in the rest position, engages a nonporous, plastic closure element **118** formed with an aperture or opening **120** into which the type **96** projects for contact with an ink saturated pad assembly **122.** The pad assembly **122** as more clearly seen in FIGS. **9** and **10,** includes a rayon cloth disc **124** secured to a felt backing **126** by staples **128.** The pad is saturated by ink received fron ink stored within the absorbent foam filler **130** held in a compressed state against the pad. It will therefore be apparent, that when the print head is in its rest position, the opening **120** in the plastic closure **118** is sealed by an adjusted contact pressure to prevent drying of ink from exposure to air. Momentary displacement of the print head to the marking position and return thereof to the rest position, causes a slight pumping action as the print head presses against the plastic closure element **118** thereby forcing a flow of ink to immediately replace the ink wiped off **96** during each marking cycle. The spring **114** yieldably resists displacement of the housing **98** by the force of the print head on the closure element **118** to regulate the pumping action resulting from displacement of the closure element relative to the housing. Thus, there is a continuous distribution of ink to insure saturation of the pad **122** with a minimum exposure of the ink to air. A fast drying type of ink may therefore be utilized.

A snubber assembly **132** as shown in FIGS. **1** and **4** engages the film to stop movement thereof while being imprinted and includes a support arm **134** attached to the carrier block **60** on the same plane as the holder **70** for the print head **46.** A flat rubber pad **136** carried on the plate **138** on the end of the support arm **134** contacts the film or packaging material **50** aforementioned while the block **60** is holding the print head in its marking position corresponding to the dwell or stop period for the mechanism of the packaging machine (not shown) that intermittently advances the packaging film. The snubber assembly is thereby operative to prevent any movement of the film because of vibration or feedback caused by the film feeding mechanism (not shown) while the film is being imprinted. In order to accelerate drying of the ink imprinted on the film, a stream of air is directed onto the film from the same source of air supplied to the air cylinder **34** simultaneously with the intermittent displacement of the print head to the marking position. The air constituting a drying fluid is directed onto the printed area of the film by a nozzle **140** as shown in FIG. **4,** that is held in position on the frame **20** by a clamp assembly **142.** Air is supplied to the nozzle by a supply conduit **144.**

An important feature of the invention as hereinbefore described resides in the replaceable ink storing cartridge **48** which is pre-inked by partially filling the housing **98** with a dye and fast drying solvent before the absorbent filler **130,** pad assembly **122** and apertured closure element **118** is inserted. Another feature of the

invention resides in the ability of the cartridge to be reprimed. After the cartridge has been used and the supply of ink apparently exhausted, it may be reprimed by adding solvent through the opening **120** in the closure element while held depressed to compress the filler. The added solvent will then be absorbed by the filler in response to its expansion upon release of the closure element. The solvent mixes with the remaining ink dye in the filler to form a new ink solution.

A freshly inked cartridge **48** is maintained in a storage condition prior to use by applying a storage cap **146** to the open end **110** of the cartridge housing **98** as shown in FIGS. **11** and **12.** To prevent leakage of ink, an impermeable layer **148** such as a film of Saran, is placed over the end **110** under the cap **148.** In order to prevent development of suction upon removal of the cap **146,** vent holes **150** are formed in the cap. The cap is retained in place during transport and the vent holes covered by a strip of adhesive **152.**

The foregoing is considered ss illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention.

What is claimed as new is as follows:

1. In combination with a print head and a power operated displacing mechanism for momentarily displacing the print head from a rest position to a marking position, ink storing means comprising a container having an open end into which the print head projects in the rest position, an ink pad positioned within the container adjacent the open end for contact by the print head in the rest position thereof, a non-porous closure element spacing the pad from the open end and having an opening through which the pad is exposed for contact by the print head, an ink storing filler within the container backing the pad, means mounting the container for limited displacement in response to engagement of the pad by the print head approaching the rest position, and spring means yieldably resisting said displacement of the container.

2. Apparatus for intermittently marking a surface, comprising a frame assembly, a print head, a displacing mechanism for momentarily displacing the print head from a rest position to a marking position contacting said surface, ink storing means mounted by the frame assembly for engagement by the print head in the rest position thereof, and means including a adjustably yieldable element engageable with the ink storing means for regulating flow of ink to the print head said flow being induced by a pumping action of the ink storing means in response to displacement of the print head between the rest and marking positions, said ink storing means including an ink storing filler, an ink saturated pad in contact with the filler, a housing enclosing the filler and the pad, said housing having an open end, and apertured closure means within the housing at the open end for sealing the ink within the housing when engaged by the print head, said frame assembly including a sleeve within which the housing is slidably received, said sleeve having a stop formation at one end engaged by the open end of the housing under the adjusted bias of the yieldable element, and means for guiding movement of the housing relative to the sleeve in response to displacement thereof by the print head against the bias of the yieldable element.

* * * * *