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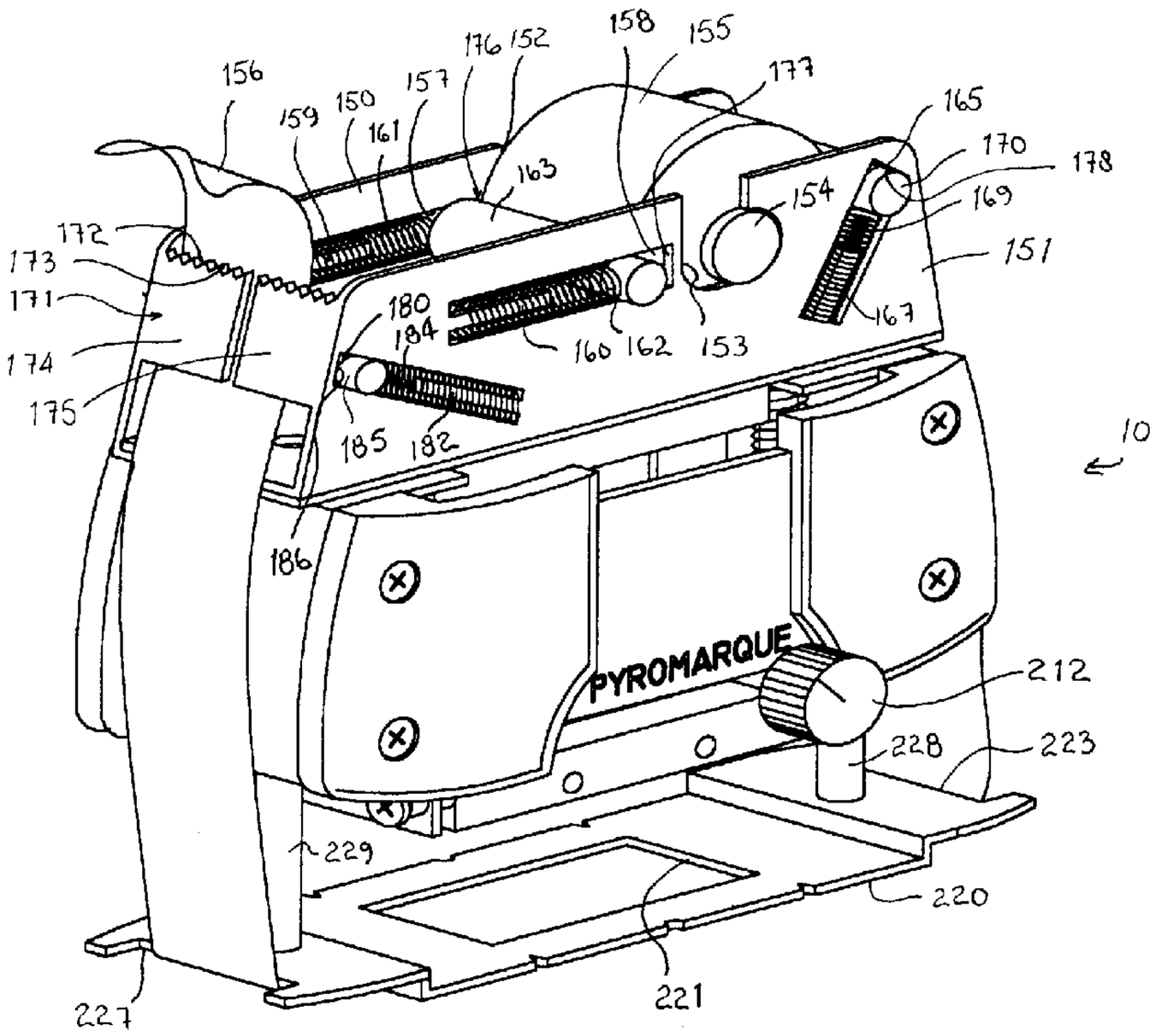
(54) **APPAREIL D'IMPRESSION A SEC PORTATIF ACTIVE MANUELLEMENT**

(54) **PORTABLE HAND-HELD MANUALLY OPERATED DRY PRINTING APPARATUS**



(57) A portable hand-held manually operated dry printing apparatus comprises a frame structure, a ribbon holder mounted on the top portion of the frame structure, a dry printing unit mounted on the lower portion of the frame structure and comprising a die member and a heating device for heating the die member, two handles respectively mounted on the two sides of the frame structure, and a ribbon guiding system for guiding the ribbon from the ribbon holder along a path extending between the die member and the surface on which dry printing is performed. Each handle is spaced apart from a portion of the dry printing apparatus heated by the heating device to define an air passage between the handle and the surrounding heated portion, to thereby ventilate an inner face of the handle and prevent this handle from being heated. The ribbon guiding system comprises a generally rectangular bottom plate defining a window and two end notches for guiding the ribbon in front of the window. This generally rectangular bottom plate is mounted to the frame structure through a pair of spring-biased sliding posts sliding on the frame structure against the force exerted by helical springs to apply the die member to the ribbon through the window and thereby transfer material from the ribbon to the surface on which dry printing is performed. The force exerted by the spring members returning the sliding posts and therefore the die member to their initial rest position after the dry printing operation is completed.

ABSTRACT OF THE DISCLOSURE

A portable hand-held manually operated dry printing apparatus comprises a frame structure, a ribbon holder mounted on the top portion of the frame structure, a dry printing unit mounted on the lower portion of the frame structure and comprising a die member and a heating device for heating the die member, two handles respectively mounted on the two sides of the frame structure, and a ribbon guiding system for guiding the ribbon from the ribbon holder along a path extending between the die member and the surface on which dry printing is performed. Each handle is spaced apart from a portion of the dry printing apparatus heated by the heating device to define an air passage between the handle and the surrounding heated portion, to thereby ventilate an inner face of the handle and prevent this handle from being heated. The ribbon guiding system comprises a generally rectangular bottom plate defining a window and two end notches for guiding the ribbon in front of the window. This generally rectangular bottom plate is mounted to the frame structure through a pair of spring-biased sliding posts sliding on the frame structure against the force exerted by helical springs to apply the die member to the ribbon through the window and thereby transfer material from the ribbon to the surface on which dry printing is performed. The force exerted by the spring members returning the sliding posts and therefore the die member to their initial rest position after the dry printing operation is completed.

PORTABLE HAND-HELD MANUALLY OPERATED DRY PRINTING APPARATUS

BACKGROUND OF THE INVENTION

1. Field of the invention:

The present invention relates to a portable hand-held manually operated apparatus for performing dry printing on miscellaneous surfaces and objects, for example to dry print identification indicia for trade branding or to discourage theft.

2. Brief description of the prior art:

No practical solutions to this kind of problem have been proposed in the prior art. Although hot embossing is a well known process, most traditional hot printing machines have been relying on C-shaped frames provided with a lower platen on which the workpiece must be positioned to carry out the printing operation. Such a hot printing machine is disclosed in US patent Nº 4 628 810 (Chan) issued on December 16, 1986, showing a C-shaped press bringing a heated die in indirect contact with the workpiece through an embossing film. The combination of heat and pressure applied to the film causes the transfer

to the surface of the workpiece of a part of a transfer material coating the film. Some embossing of the workpiece surface may also be performed as a function of the process parameters, such as temperature, pressure and application time, to create a more durable marking.

Although the prior art apparatus as described in US patent № 4,628,810 enables application of a high force to produce the pressure required for proper printing and embossing on the workpiece surface, it presents the following drawbacks:

- it produces a limited stroke and restricts the size of the workpiece since that workpiece has to be inserted between the die and the platen;

- it is always required to bring the workpiece to the workstation; and

- their rigid assembly does not provide for self-adjustment to sloped or non planar surface, thus yielding an uneven pressure to the surface and poor printing quality.

US patent № 4,181,560 granted to Maitland on January 1st, 1980 shows a marking device featuring an open-ended housing and accepting a hot die foil stamping head. Still, this marking device is intended for mechanical operation and lacks appropriate film reel management, temperature control, and any other feature that would enable manual operation thereof, so that it could be brought to a site to mark objects in variable locations and positions without having to move these objects.

US patent Nº 4,904,334 (Honma et al.) granted on February 27, 1990 discloses a hand-held manually operated apparatus for applying a transfer material on an image portion of a photocopy. A ribbon made of a film including transfer material is first brought into contact with the surface of the photocopy by a downward vertical displacement of a heated flat plate, which heated flat plate is subsequently sled over the film to apply the transfer material onto the desired area of the photocopy. Obviously, this apparatus has not been designed for printing and embossing operations due mainly to the absence of a replaceable embossing die and temperature control to provide adequate printing temperature for different films and workpiece materials or desired embossing depth. Also, such an apparatus does not provide the operator with a visual feedback to properly position an eventual printing die so as to print an indicia at a precise location on a workpiece. Moreover, the free end of the ribbon is not properly held to permit lifting and repositioning of the apparatus after each printing operation. Still, cutting of the ribbon is only possible after final use of the apparatus, by using a serrated portion of the closure cap.

The above discussed prior art demonstrates that no reasonably practical solution to the problem of hot embossing on miscellaneous objects in the field of identification or for any other purpose has been provided yet.

OBJECTS OF THE INVENTION

An object of the present invention is therefore to overcome the limitations and drawbacks of the above discussed prior art.

Another object of the present invention is to provide a portable hand-held manually operated dry printing apparatus that is light, compact and portable to allow a user to easily perform a professional quality dry printing at the client's site, by moving the apparatus to and at any position around the objects rather than moving the objects.

A third object of the present invention is to provide a portable hand-held manually operated dry printing apparatus comprising an open-ended structure permitting dry printing on objects of any size.

A fourth object of the present invention is to provide a portable hand-held manually operated dry printing apparatus in which the heat generated by the heating element is dissipated so that the temperature of the handles will remain sufficiently low to enable, at all time, comfortable manipulation.

A further object of the invention is to provide a portable hand-held manually operated dry printing apparatus featuring an ergonomic design to provide comfortable operation using both hands and visual feedback for accurate positioning, application of the proper pressure intensity and adaptability to inclinations and a certain degree of irregularity of the workpiece surface.

A sixth object of the present invention is to provide a portable hand-held manually operated dry printing apparatus capable of controlling the temperature of the die over a wide range of temperatures to perform different types of dry printing and embossing on various surfaces made of various materials, and having a relatively low thermal inertia for rapid warm-up and temperature changes.

A still further object of the present invention is to provide a portable hand-held manually operated dry printing apparatus providing permanent guidance of the embossing ribbon to maintain the proper operational relationship with respect to the die and the workpiece surface, and comprising a continuously available ribbon cutting device.

SUMMARY OF THE INVENTION

More specifically, in accordance with the present invention, there is provided a portable hand-held manually operated dry printing apparatus comprising a frame structure having a lower portion and two sides, and a dry printing unit mounted on the lower portion of the frame structure. The dry printing unit comprises a die member and means for heating this die member, a portion of the dry printing apparatus surrounding the heating means being also heated. Two handles are mounted on the two sides of the frame structure, respectively. Each handle is spaced apart from the heated surrounding portion to define an air passage between the handle and the heated surrounding portion to

thereby ventilate an inner face of the handle and prevent this handle from being heated by the heating means.

Preferably:

- the air passage is a vertically extending air passage; and

- the frame structure is hollow and the two sides of the frame structure are open to ventilate, preferably by natural convection, an empty space situated in the hollow frame structure between the two handles.

The present invention also relates to a portable hand-held manually operated dry printing apparatus comprising a frame structure having upper and lower portions, a ribbon holder mounted on the top portion of the frame structure for supplying a ribbon including material to be transferred to a surface on which dry printing is performed, a dry printing unit mounted on the lower portion of the frame structure and comprising a die member and means for heating this die member, and ribbon guiding means for guiding the ribbon from the ribbon holder along a path extending between the die member and the surface on which dry printing is performed and for returning the ribbon back to the ribbon holder.

Preferably:

- the ribbon holder comprises a ribbon cutter and the ribbon is returned back to the ribbon cutter where a used ribbon section can be cut;

alternatively, the used ribbon could be manually or automatically winded onto a roller rotatably mounted on the ribbon holder;

- the ribbon guiding means comprises a generally rectangular bottom plate defining a window and two end notches for positioning and guiding the ribbon in front of the window;

- the generally rectangular bottom plate is mounted on the frame structure through a pair of spring-biased sliding posts which slide, from an initial rest position, on the frame structure against the force exerted by spring members to apply the die member to the ribbon through the window and thereby transfer material from the ribbon to the surface on which dry printing is performed, the force exerted by the spring members returning the sliding posts and therefore the die member to the initial rest position after the dry printing operation is completed;

Further in accordance with the present invention, there is provided a portable hand-held manually operated dry printing apparatus comprising a frame structure having a top portion, a lower portion and two sides, a ribbon holder mounted on the top portion of the frame structure for supplying a ribbon including material to be transferred to a surface on which dry printing is performed, a dry printing unit mounted on the lower portion of the frame structure and comprising a die member and means for heating this die member, two handles respectively mounted on the two sides of the frame structure, and ribbon guiding means for guiding the ribbon from the ribbon holder along a path extending between the die member and the surface on which dry printing is performed.

Preferably:

- the die member is a dry printing and embossing die;

- the die member comprises an electronically programmable matrix of individual heating elements, these individual heating elements forming an array of selectively heatable pixels;

- the portable hand-held manually operated dry printing apparatus comprises a lower open side window to enable an operator to see the dry printing operation;

- the portable hand-held manually operated dry printing apparatus comprises means for visually selecting the area where dry printing is performed, wherein the visually selecting means comprises a generally rectangular bottom plate defining a window and two end notches for guiding the ribbon in front of the window, and wherein the generally rectangular bottom plate is mounted on the frame structure through a pair of spring-biased sliding posts which slide, from an initial rest position, on the frame structure against the force exerted by spring members to apply the die member to the ribbon through the window and thereby transfer material from the ribbon to the surface on which dry printing is performed, the force exerted by the spring members returning the sliding posts and therefore the die member to the initial rest position after the dry printing operation is completed;

- the die member comprises compliant heat conductive material to adapt to an irregular surface on which dry printing is performed;

- the die member comprises rotatable wheels each bearing a peripheral series of indicia, each of said wheels being rotatable to select one of the indicia to be dry printed on the surface; and

- the heating means comprises at least one electric heating element, or another type of heat source such as a gas burner.

The objects, advantages and other features of the present invention will become more apparent upon reading of the following non restrictive description of a preferred embodiment thereof, given by way of example only with reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

In the appended drawings:

Figure 1 is an isometric view of a preferred embodiment of the portable hand-held manually operated dry printing apparatus in accordance with the present invention;

Figure 2 is an exploded view of the portable hand-held manually operated dry printing apparatus of Figure 1, showing the various parts thereof as well as their relationship;

Figure 3a is a top plan view of the portable hand-held manually operated dry printing apparatus of Figure 1;

Figure 3b is a right side elevational view of the portable hand-held manually operated dry printing apparatus of Figure 1; and

Figure 3c is a front elevational view of the portable hand-held manually operated dry printing apparatus of Figure 1.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the appended drawings, the portable hand-held manually operated dry printing apparatus is generally identified by the reference 10.

The portable hand-held manually operated dry printing apparatus 10 comprises a box-like frame 11. Mounted on the frame 11 are two handles 12 and 13, a ribbon holder 14 and a dry printing unit 15.

Box-like frame 11:

As shown in Figure 2, the frame 11 is made of sheet metal, for example sheet steel. The sheet metal is bent as illustrated in Figure 2 to define a top planar wall 110, a front vertical wall 111, a rear vertical wall 112, side vertical tabs 113-116, bottom wall portions 117 and

118 and vertical bottom tabs 119 and 120. As can be seen, the two sides and the bottom of the box-like frame are open.

Ribbon holder:

The ribbon holder 14 comprises a first and second holder sections 140 and 141 each having a right angle cross section. The holder section 140 comprises a flat horizontal base 142 applied to the top face of planar wall 110. In the same manner, the holder section 141 comprises a flat horizontal base 143 applied to the top face of the flat horizontal base 142. In other words, the flat horizontal bases 142 and 143 are superposed and then fastened to the top planar wall 110 by means of two screws 144 and 145 driven through the flat horizontal bases 142 and 143 and through the top planar wall 110.

The holder sections 140 and 141 further comprise vertical, upwardly extending flat walls 150 and 151, respectively. The flat walls 150 and 151 comprise a pair of L-shaped slots 152 and 153 to receive the respective ends of an axle 154. The function of the axle 154 is to support a roll 155 of dry printing ribbon 156.

The vertical, upwardly extending flat walls 150 and 151 comprise respective, symmetrical and horizontal slots 157 and 158. Slot 157 is provided with a longitudinal tongue 159 at the end of the slot 157 opposite to the L-shaped slot 152. In the same manner, slot 158 is provided with a longitudinal tongue 160 at the end of the slot 158 opposite to the L-shaped slot 153. A helical spring 161 is placed in the slot 157 on the tongue 159. In the same manner, a helical spring 162 is

placed in the slot 158 on the tongue 160. Finally, a roller 163 comprises a first smaller diameter end inserted in slot 157 between the free end of the spring 161 and the non tongued end 176 (Figure 1) of the slot 157, and a second smaller diameter end inserted in slot 158 between the free end of the spring 162 and the non tongued end 177 (Figure 1) of the slot 158. As can be appreciated, the compression force of the springs 161 and 162 will apply the roller 163 to the roll 155 to retain the axle 154 in the L-shaped slots 152 and 153, and to produce a slight friction force against rotational movement of the roll 155 and thereby prevent undesired unwinding of the ribbon 156. Of course, it will be possible, by compressing the helical springs 161 and 162, to remove axle 154 from the L-shaped slots 152 and 153 to replace, for example, an empty roll 155.

The vertical, upwardly extending flat walls 150 and 151 comprise respective, front symmetrical and oblique slots 164 and 165 situated on the side of the L-shaped slots 152 and 153 opposite to the slots 157 and 158. Slot 164 is provided with a longitudinal tongue 166 at the lower end thereof. In the same manner, slot 165 is provided with a longitudinal tongue 167 at the lower end thereof. A helical spring 168 is placed in the slot 164 on the tongue 166. In the same manner, a helical spring 169 is placed in the slot 165 on the tongue 167. Finally, a roller 170 comprises a first end inserted in slot 164 between the free end of the spring 168 and the non tongued upper end of the slot 164, and a second end inserted in slot 165 between the free end of the spring 169 and the non tongued end 178 (Figure 1) of the slot 165. As can be appreciated, the compression force of the springs 168 and 169 will apply the roller 170 to the non tongued upper ends of the slots 164 and 165, respectively. As

illustrated in Figure 3a, ribbon 156 unrolled from roll 155 passes above roller 170 to facilitate supply of this ribbon, as will become apparent to those of ordinary skill in the art upon reading the following description.

Referring back to Figure 2, the free end of the ribbon 156 is returned to the rear portion of the ribbon holder 14, more specifically to a ribbon cutter 171. As illustrated in Figure 1, the ribbon cutter 171 is formed with a cutting edge 172 comprising a plurality of triangular teeth such as 173 to cut a used ribbon section. The ribbon cutter 171 is formed of an end, right angle extension 174 (Figures 1 and 2) of the vertical, upwardly extending flat wall 150, and an end, right angle extension 175 (Figures 1 and 2) of the vertical, upwardly extending flat walls 151. Figure 1 shows that the free end of the ribbon 156 passes behind the cutter 171.

The vertical, upwardly extending flat walls 150 and 151 comprise respective, rear symmetrical and oblique slots 179 and 180 situated in the proximity of the ribbon cutter 171. Slot 179 is provided with a longitudinal tongue 181 at the lower end thereof. In the same manner, slot 180 is provided with a longitudinal tongue 182 at the lower end thereof. A helical spring 183 is placed in the slot 179 on the tongue 181. In the same manner, a helical spring 184 is placed in the slot 180 on the tongue 182. Finally, a roller 185 comprises a first end inserted in slot 179 between the free end of the spring 183 and the non tongued upper end of the slot 179, and a second end inserted in slot 180 between the free end of the spring 184 and the non tongued end 186 (Figure 1) of the slot 180. As can be appreciated, the compression force of the springs 183 and 184 in cooperation with the roller 185 will apply the dry printing ribbon

156 to the inner face of the ribbon cutter 171. The pressure applied to the ribbon 156 by the springs 183 and 184 will cause resistance to sliding of the ribbon 156 on the inner face of the right angle extensions 174 and 175 to normally retain the free end of the ribbon 156 while allowing manual pulling of that ribbon 156.

Alternatively, the used ribbon 156 could be manually or automatically winded onto a roller (not shown) rotatably mounted on the ribbon holder 14.

Dry printing unit:

The dry printing unit 15 comprises a heat-conductive plate member 200 having a h-shaped cross section. The h-shaped plate member 200 has a larger vertical wall 203 and a horizontal wall 204 defining an upper 90° corner 201 in which an electric heating element 202 is placed. An adjustable thermostat 208 is mounted on the top face of the horizontal wall 204 adjacent to the heating element 202 on the side opposite to corner 201. The housing of the thermostat 208 is elongated and comprises end tabs such as 205. Two screws 206 and 207 are inserted in holes such as 209 of the two end tabs such as 205 and driven into respective threaded holes 210 and 211 of the vertical wall 203 to fasten the thermostat 208 to the h-shaped plate member 200 with the heating element 202 squeezed between the housing of the thermostat 208 and the vertical wall 203.

The thermostat 208 comprises a rotatable knob 212 to adjust the level of temperature produced by the heating element 202.

The operation of a thermostat is well known to those of ordinary skill in the art and, accordingly, will not be further described in the present specification. Also, although the electrical connections between the thermostat 208, the heating element 202 and the electric supply cord 213 (Figures 3a and 3c) are not illustrated, such connections are well known to those of ordinary skill in the art and will not be further described.

It is also within the scope of the present invention to replace the electric heating element 202 and the associated thermostat 208 by other types of heat source and temperature control, such as a gas (butane) burner, etc.

The h-shaped plate member 200 defines an underside cavity 214, presenting the general shape of a parallelepiped. A dry printing die member 215 is placed in the cavity 214 and fixed in this cavity 214 through a pair of set screws 216 and 217 respectively driven in a pair of threaded holes 218 and 219 of the smaller vertical wall 220 of the h-shaped plate member 200.

The dry printing die member 215 may be formed with a relief 242 for embossing the surface of an object during the dry printing operation. As shown in Figure 3b and in addition to the relief 242, the die member 215 can include a number of rotatable wheels such as 243 and 244 bearing a peripheral series of indicia (letters, numbers, typographic symbols, iconic symbols, etc.) to be dry printed and/or embossed on the surface of the object. A specific indicia or a position having no indicia on the circumference of one wheel 243 or 244 can be selected by rotating

this wheel 243 or 244 using an appropriate elongated tool such as a screwdriver.

As an alternative to the combination of fixed and manually selectable indicia of the die member 215, an electronically programmable matrix of individual heating elements can be used in cooperation with a portable micro controller. Such a programmable heat printing matrix using hot needles or resistive elements to form the array of selectively heatable pixels are known in the art and available on the market.

The h-shaped plate member 200 is mounted to the frame as follows:

- a first screw 20 is inserted in a hole 21 of the bottom tab 119 and screwed into a corresponding threaded hole (not shown) made in the h-shaped plate member 200, with a heat resistant washer 22 mounted on the screw 20 and interposed between the head of the screw 20 and the tab 119, and a heat resistant sleeve 23 mounted on the screw 20 between the tab 119 and the h-shaped plate member 200;

- a second screw 24 is inserted in a hole 25 of the bottom tab 119 and screwed into a corresponding threaded hole (not shown) made in the h-shaped plate member 200, with a heat resistant washer 26 mounted on the screw 24 and interposed between the head of the screw 24 and the tab 119, and a heat resistant sleeve 27 mounted on the screw 24 between the tab 119 and the h-shaped plate member 200;

- a third screw 28 is inserted in a hole 29 of the bottom tab 120 and screwed into a corresponding threaded hole 30 made in the h-shaped plate member 200, with a heat resistant washer 31 mounted on the screw 28 and interposed between the head of the screw 28 and the tab 120, and a heat resistant sleeve 32 mounted on the screw 28 between the tab 120 and the h-shaped plate member 200; and

- a fourth screw 33 is inserted in a hole 34 of the bottom tab 120 and screwed into a corresponding threaded hole 35 made in the h-shaped plate member 200, with a heat resistant washer 36 mounted on the screw 33 and interposed between the head of the screw 33 and the tab 120, and a heat resistant sleeve 37 mounted on the screw 33 between the tab 120 and the h-shaped plate member 200.

Finally, the dry printing unit 15 comprises a generally rectangular bottom plate 290 formed with a generally rectangular, generally central window 221, a first end tab 224 formed with a hole 222 and a wide rectangular end notch 223 forming a ribbon guide. The generally rectangular bottom plate 290 further comprises a second end tab 225 opposite to the first end tab 224 and formed with a hole 226 and a wide rectangular end notch 227 forming a ribbon guide.

The generally rectangular bottom plate 220 is associated with a set of two posts 228 and 229. The first end tab 224 is fastened to the lower end of the post 228 by means of a screw 241 passing through the hole 222 and screwed in an axial threaded hole (not shown) made in the bottom face of the post 228. In the same manner, the second end tab 225 is fastened to the lower end of the post 229 by means of a screw 240

passing through the hole 226 and screwed in an axial threaded hole (not shown) made in the bottom face of the post 229.

A top bushing 231 is mounted in hole 146 of top planar wall 110, and a bottom bushing 232 is mounted in hole 190 of bottom wall portion 117. Post 228 is inserted through bottom bushing 232, top bushing 231, hole 192 of flat horizontal base 142 and hole 193 of flat horizontal base 143. Bushings 231 and 232 and holes 192 and 193 are coaxial to enable longitudinal sliding of the post 228 therein.

A helical spring 230 is mounted on the post 228 between the top bushing 231 and the bottom bushing 232. Post 228 further comprises a circular groove 233 to receive a spring clip 234 situated between the bottom bushing 232 and the lower end of the spring 230. The spring clip 234 will rest on the top face of bushing 232 to limit the downward stroke of the post 228 and thereby hold this post 228 in the bushings 231 and 232 and in the holes 192 and 193.

The outer surface of the post 228 has a threaded portion 248 on which an threaded nut 247 is engaged.

A top bushing 235 is mounted in hole 149 of top planar wall 110, and a bottom bushing 237 is mounted in hole 191 of bottom wall portion 118. Post 229 is inserted through bottom bushing 237, top bushing 235, hole 147 of flat horizontal base 142 and hole 148 of flat horizontal base 143. Bushings 235 and 237 and holes 147 and 148 are coaxial to enable longitudinal sliding of the post 229 therein.

A helical spring 236 is mounted on the post 229 between the top bushing 235 and the bottom bushing 237. Post 229 further comprises a circular groove 238 to receive a spring clip 239 situated between the top surface of the bottom bushing 237 and the lower end of the spring 236. The spring clip 239 will rest on the top face of bushing 237 to limit the downward stroke of the post 229 and thereby hold this post 229 in the bushings 235 and 237 and in the holes 147 and 148.

The outer surface of the post 229 has a threaded portion 246 on which an threaded nut 245 is engaged.

A nut 245 engaged on a threaded portion 246 of the post 229 and a nut 247 engaged on a threaded portion 248 of the post 228 constitute stop members longitudinally adjustable along the posts 228 and 229 to adjust the downward stroke of the die member 215 and thus the embossing depth. More specifically, nuts 245 and 247 apply to the underside of the wall portions 118 and 117, respectively, to limit the downward stroke of the die member 215 and thus the embossing depth. Other alternative embodiments such as a ring member (not shown) with a set screw (not shown) could be used in the place of the nuts 245 and 247.

Handles 12 and 13:

The handles 12 and 13 are mounted on the frame 11 as follows:

- a first screw 300 is inserted through a hole 301 of the handle 13, a hole 302 of the tab 114, a hole 303 of the tab 113 and a hole 304 of the handle 12, and a nut 305 is finally driven onto the end of the screw 300 on the outer side of the handle 12;

- a second screw 306 is inserted through a hole 307 of the handle 13, a hole 308 of the tab 114, a hole 309 of the tab 113 and a hole 310 of the handle 12, and a nut 311 is finally driven onto the end of the screw 306 on the outer side of the handle 12;

- a third screw 312 is inserted through a hole 313 of the handle 13, a hole 314 of the tab 116, a hole 315 of the tab 115 and a hole 316 of the handle 12, and a nut 317 is finally driven onto the end of the screw 312 on the outer side of the handle 12; and

- a fourth screw 318 is inserted through a hole 319 of the handle 13, a hole 320 of the tab 116, a hole 321 of the tab 115 and a hole 322 of the handle 12, and a nut 323 is finally driven onto the end of the screw 318 on the outer side of the handle 12.

As illustrated in Figure 2, a vertically extending air passage is defined between the inner face of each handle 12,13 and the box-like frame 11. Accordingly, each handle 12,13 is spaced apart from the portion (for example the h-shaped plate member 200 and the box-like frame 11) of the dry printing apparatus surrounding and heated by the heating means (for example the electric element 202 and thermostat 208) to define an air passage between each handle 12,13 and the heated surrounding portion of the dry printing apparatus and thereby ventilate the

inner face of each handle 12,13 and dissipate heat produced by the heating means. This prevents the handles 12 and 13 from being heated and enables comfortable manipulation at all time.

Since the two sides of the hollow box-like frame 11 are open, the empty space situated in the hollow box-like frame 11 between the two handles 12 and 13 is also ventilated.

Operation of the portable hand-held manually operated dry printing apparatus 10 will now be described.

As a preliminary step, ribbon 156 is pulled and unrolled from roll 155, is passed through the ribbon guiding notches 223 and 227 to guide the ribbon 156 in front of the window 221 at all time, and is finally passed between roller 185 and ribbon cutter 171. If desired ribbon 156 is cut by means of the cutting edge 172.

The cord 213 is then plugged into an electric outlet (not shown) and the knob 212 is adjusted to obtain the desired temperature of the printing and embossing die member 215.

The portable hand-held manually operated dry printing apparatus 10 is then grasped by the user and the generally rectangular bottom plate 290, and therefore the ribbon 156 is applied to the article with the window 221 on the area to be dry printed and embossed. Accordingly, the generally rectangular bottom plate 290 and the window 221 constitute means for visually selecting the area where dry printing is performed; the spacing between the generally rectangular bottom plate

290 and the two handles 12 and 13 defines lower open side windows enabling an operator to visually select the area on which dry printing is performed. Pressure is then applied toward the object to compress the helical springs 230 and 236, and slide the posts 228 and 229 in the set of coaxial holes 190, 146, 192 and 193 and the set of coaxial holes 191, 149, 147 and 148, respectively. The helical springs 230 and 236 are compressed until the nuts (stop members) 245 and 247 rest on the underside of the bottom walls portions 118 and 117, respectively, to apply the dry printing and/or embossing die member 215 through the window 221 to the area on which dry printing and/or embossing is to be performed; again the spacing between the generally rectangular bottom plate 290 and the handles 12 and 13 defines lower open side windows enabling an operator to visually see and appropriately manually control the dry printing and/or embossing operation. The ribbon consists of a film normally made of plastic material coated on one side with heat transferrable material the latter being applied, during the dry printing operation to the surface on which dry printing is performed; this type of ribbon is well known to those of ordinary skill in the art. The heated die member 215 will then apply the portion of the ribbon 156 located in front of the window 221 to the selected area of the object to thereby dry print and eventually emboss that article. Then, coating material will be transferred from the film to the surface of the object. The time of application of the die member 215 can widely vary in relation to various parameters such as the nature of the material forming the ribbon 156, the temperature of the die member 215, the nature of the material of the object on which dry printing and possibly embossing is performed, etc.

The portable hand-held manually operated dry printing apparatus presents, amongst others, the following advantages:

- the portable hand-held manually operated dry printing apparatus is light, compact and portable to perform easy and professional quality branding of objects at the client's site, at any position on the objects without having to displace the objects;

- the portable hand-held manually operated dry printing apparatus comprises an open-ended structure, i.e. a telescopic, generally rectangular plate member 290 with a window 221 to permit dry printing and embossing of objects of any size;

- the empty spaces provided within the box-like frame 11, and the empty spaces between (a) the handles 12 and 13 and (b) the box-like frame and the heating assembly including the h-shaped plate member 200, the heating element 202 and the thermostat 208 dissipate heat, advantageously by natural convection, so that the temperature of the handles 12 and 13 will remain sufficiently low to enable, at all time, comfortable manipulation;

- the portable hand-held manually operated dry printing apparatus has an ergonomic design to provide comfortable operation using both hands and visual feedback for accurate positioning, application of the proper pressure intensity;

- a layer (see 299 in Figure 2) of generally compliant and resilient heat conductive material such as silicone can be interposed between the die

member 215 and the bottom of the cavity 214 of the h-shaped plate member 200 to obtain an optimal adaptability of the portable hand-held manually operated dry printing apparatus 10 to the relief of the surface of the object to be dry printed and embossed; alternatively, the die member can be coated or completely formed with such generally compliant and resilient heat conductive material with the same advantage;

- the portable hand-held manually operated dry printing apparatus 10 comprises a thermostat 208 for controlling the temperature of the printing and embossing die member 215 over a wide range of temperatures to perform different types of dry printing and embossing on various surfaces made of various materials, and having a relatively low thermal inertia for rapid warm-up and temperature changes; and

- the portable hand-held manually operated dry printing apparatus 10 comprises wide rectangular notches 223 and 227 providing permanent guidance of the embossing ribbon 156 to maintain the proper operational relationship with respect to the die member and the workpiece surface, and comprising a continuously available ribbon cutting device 171.

In the foregoing description, the portable hand-held manually operated dry printing apparatus 10 has been described using terms such as “top”, “bottom”, “front”, “rear”, “side”, “lower”, “upper”, etc. in view of more clearly defining the positions of the various parts and elements. Of course, these terms refer to the position of the the portable hand-held manually operated dry printing apparatus 10 as illustrated in the accompanying drawings. This being said, it should be kept in mind that during operation, the portable hand-held manually operated dry

printing apparatus 10 can be inverted, tilted, laid down, etc. to perform dry printing and eventually embossing on any face of an object.

Although the present invention has been described hereinabove by way of a preferred embodiment thereof, this embodiment can be modified at will, within the scope of the appended claims, without departing from the spirit and nature of the subject invention.

WHAT IS CLAIMED IS:

1. A portable hand-held manually operated dry printing apparatus comprising:

a frame structure having a lower portion and two sides;

a dry printing unit mounted on the lower portion of the frame structure, said dry printing unit comprising a die member and means for heating said die member, a portion of the dry printing apparatus surrounding the heating means being also heated; and

two handles mounted on the two sides of the frame structure, respectively, each handle being spaced apart from the heated surrounding portion to define an air passage between the handle and said heated surrounding portion to thereby ventilate an inner face of the handle and prevent said handle from being heated by said heating means.

2. A portable hand-held manually operated dry printing apparatus as recited in claim 1, in which the air passage is a vertically extending air passage.

3. A portable hand-held manually operated dry printing apparatus as recited in claim 1, wherein said frame structure is hollow and wherein said two sides of the frame structure are open to ventilate an empty space situated in the hollow frame structure between said two handles.

4. A portable hand-held manually operated dry printing apparatus as recited in claim 1, further comprising means for supplying and guiding a dry printing ribbon between the die member and a surface on which dry printing is being performed to transfer, by heating, material from the ribbon to said surface.

5. A portable hand-held manually operated dry printing apparatus comprising:

a frame structure having upper and lower portions;

a ribbon holder mounted on the top portion of the frame structure for supplying a ribbon including material to be transferred to a surface on which dry printing is performed;

a dry printing unit mounted on the lower portion of the frame structure, said dry printing unit comprising a die member and means for heating said die member; and

ribbon guiding means for guiding the ribbon from the ribbon holder along a path extending between the die member and the surface on which dry printing is performed, and for returning the ribbon back to the ribbon holder.

6. A portable hand-held manually operated dry printing apparatus as recited in claim 5, wherein said ribbon holder comprises a ribbon cutter, and wherein the ribbon is returned back to the ribbon cutter where a used ribbon section can be cut.

7. A portable hand-held manually operated dry printing apparatus as recited in claim 5, wherein said ribbon guiding means comprises a generally rectangular bottom plate defining a window and

two end notches for positioning and guiding the ribbon in front of the window.

8. A portable hand-held manually operated dry printing apparatus as recited in claim 7, wherein the generally rectangular bottom plate is mounted to the frame structure through a pair of spring-biased sliding posts sliding on the frame structure against the force exerted by spring members to apply the die member to the ribbon through the window and thereby transfer material from the ribbon to the surface on which dry printing is performed.

9. A portable hand-held manually operated dry printing apparatus comprising:

a frame structure having a top portion, a lower portion and two sides;

a ribbon holder mounted on the top portion of the frame structure for supplying a ribbon including material to be transferred to a surface on which dry printing is performed;

a dry printing unit mounted on the lower portion of the frame structure, said dry printing unit comprising a die member and means for heating said die member;

two handles respectively mounted on the two sides of the frame structure; and

ribbon guiding means for guiding the ribbon from the ribbon holder along a path extending between the die member and the surface on which dry printing is performed.

10. A portable hand-held manually operated dry printing apparatus as recited in claim 9, wherein the die member is a dry printing and embossing die.

11. A portable hand-held manually operated dry printing apparatus as recited in claim 9, wherein said die member comprises an electronically programmable matrix of individual heating elements, said individual heating elements forming an array of selectively heatable pixels.

12. A portable hand-held manually operated dry printing apparatus as recited in claim 9, comprising a lower open side window to enable an operator to see the dry printing operation.

13. A portable hand-held manually operated dry printing apparatus as recited in claim 9, comprising means for visually selecting the area where dry printing is performed.

14. A portable hand-held manually operated dry printing apparatus as recited in claim 13, wherein said visually selecting means comprises a generally rectangular bottom plate defining a window and two end notches for guiding the ribbon in front of the window.

15. A portable hand-held manually operated dry printing apparatus as recited in claim 14, wherein said generally rectangular bottom plate is mounted on the frame structure through a pair of spring-biased sliding posts which slide, from an initial rest position, on the frame structure against the force exerted by spring members to apply the die

member to the ribbon through the window and thereby transfer material from the ribbon to the surface on which dry printing is performed, the force exerted by the spring members returning the sliding posts and therefore the die member to the initial rest position after the dry printing operation is completed.

16. A portable hand-held manually operated dry printing apparatus as recited in claim 15, further comprising stop members mounted on the sliding posts to limit a downward stroke of the die member from said initial rest position by abutting against the frame structure.

17. A portable hand-held manually operated dry printing apparatus as recited in claim 16, further comprising means for adjusting the position of the stop members along the sliding posts to thereby adjust said downward stroke.

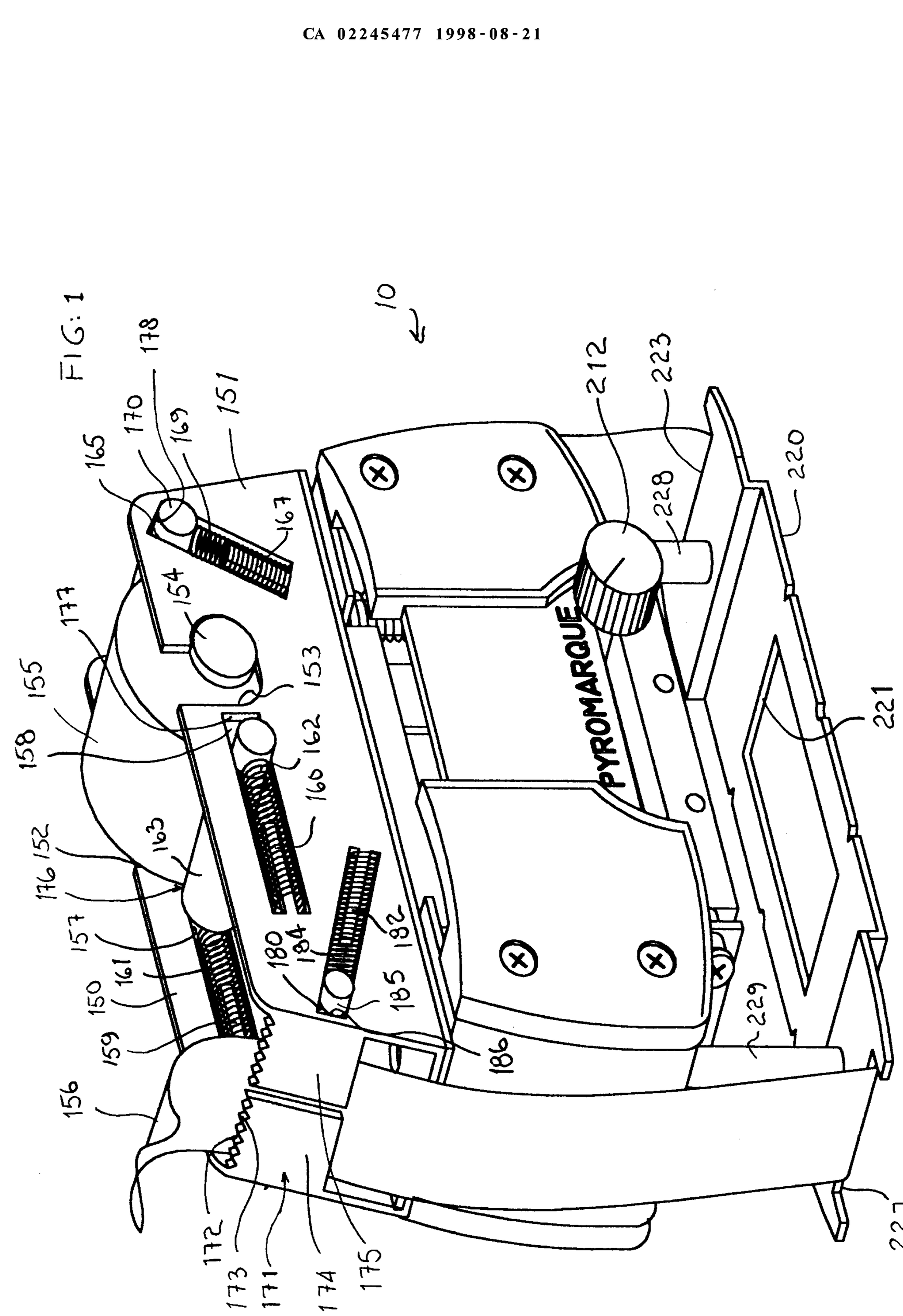
18. A portable hand-held manually operated dry printing apparatus as recited in claim 9, wherein said die member comprises compliant heat conductive material to adapt to an irregular surface on which dry printing is performed.

19. A portable hand-held manually operated dry printing apparatus as recited in claim 9, wherein the die member comprises rotatable wheels each bearing a peripheral series of indicia, each of said wheels being rotatable to select one of the indicia to be dry printed on said surface.

20. A portable hand-held manually operated dry printing apparatus as recited in claim 9, wherein the heating means comprises at least one electric heating element.

21. A portable hand-held manually operated dry printing apparatus as recited in claim 9, wherein the heating means comprises a gas burner.

FIG: 1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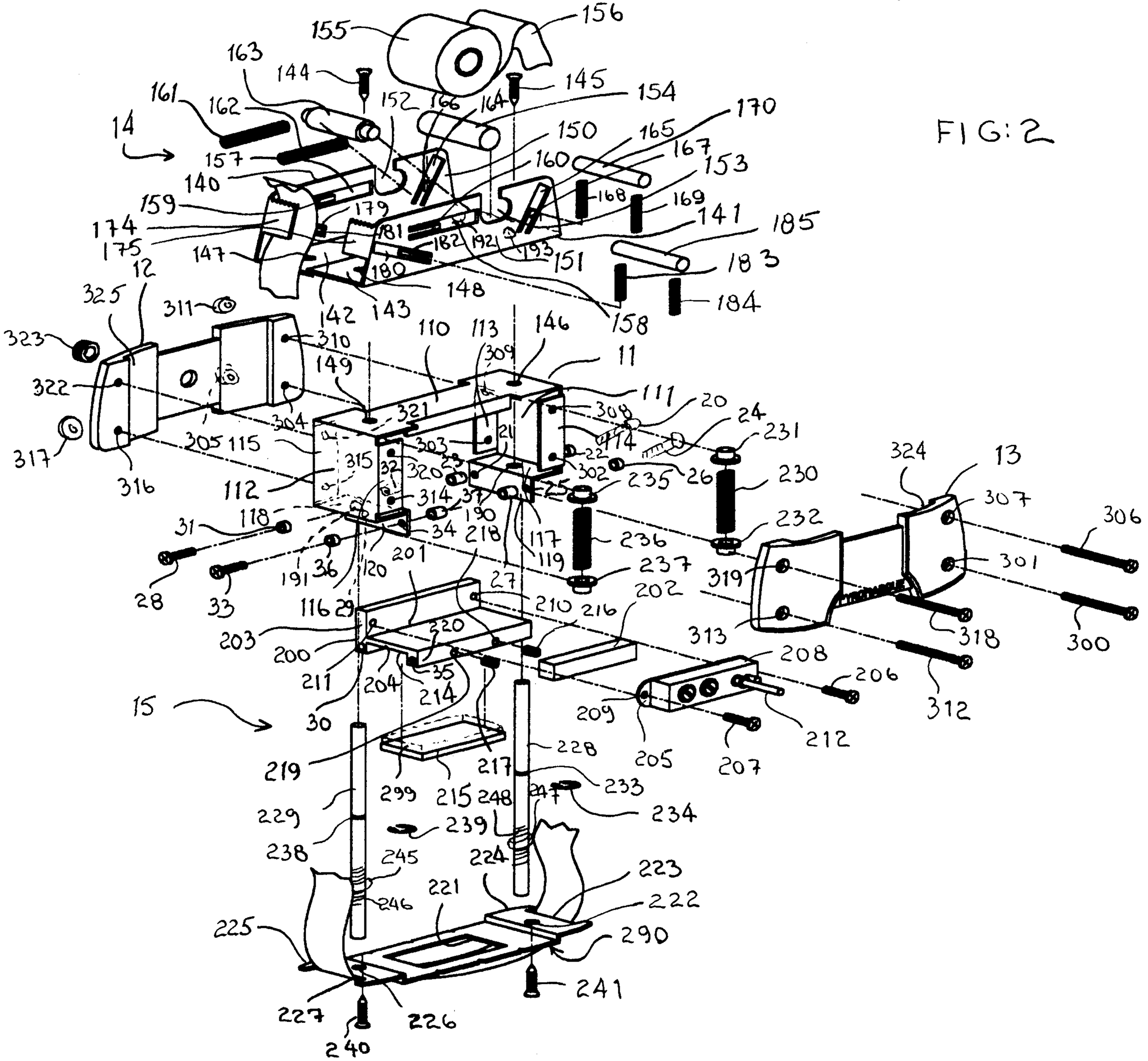

FIG:2

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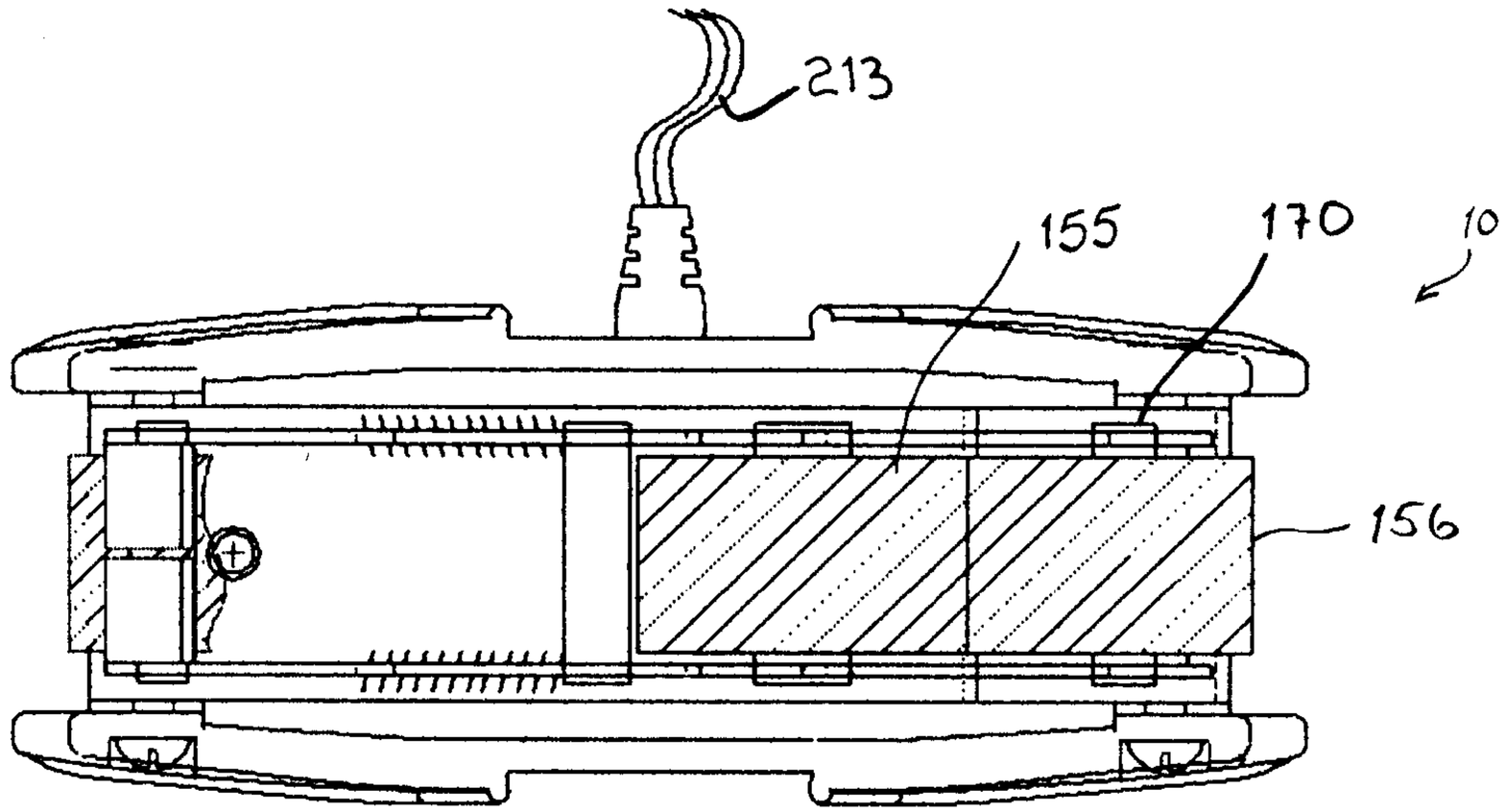
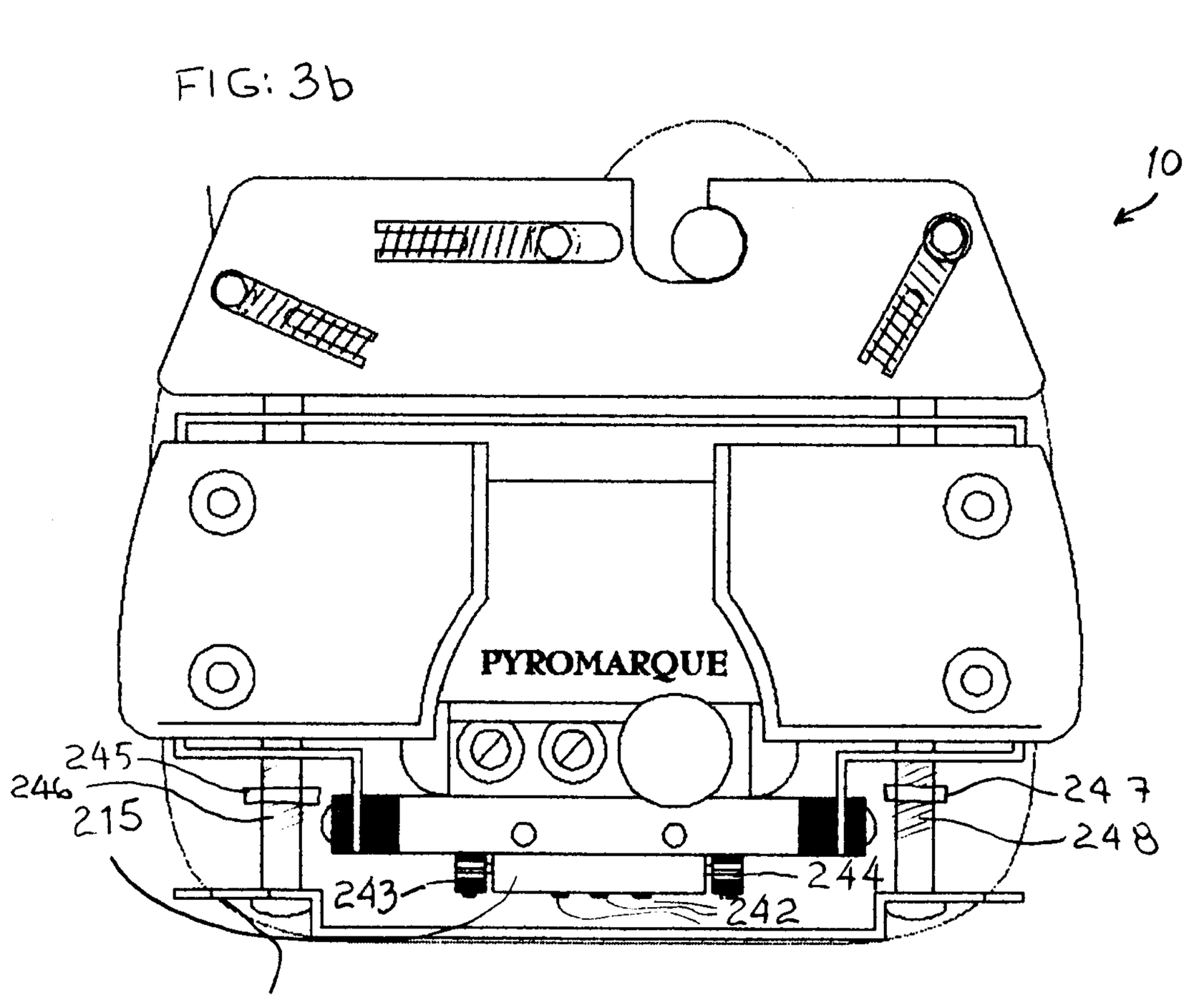


FIG : 3a

FIG: 3b



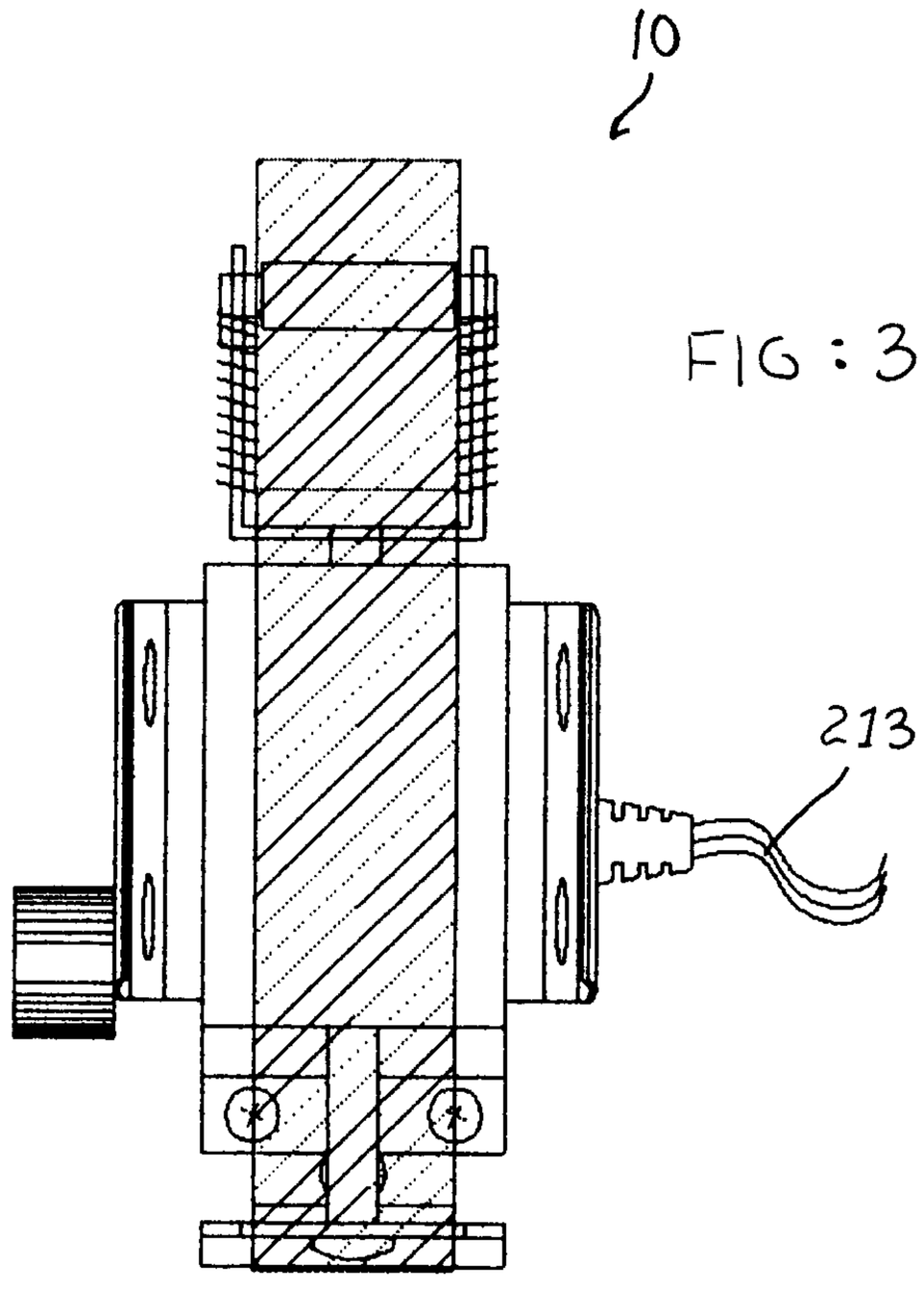


FIG : 3c