

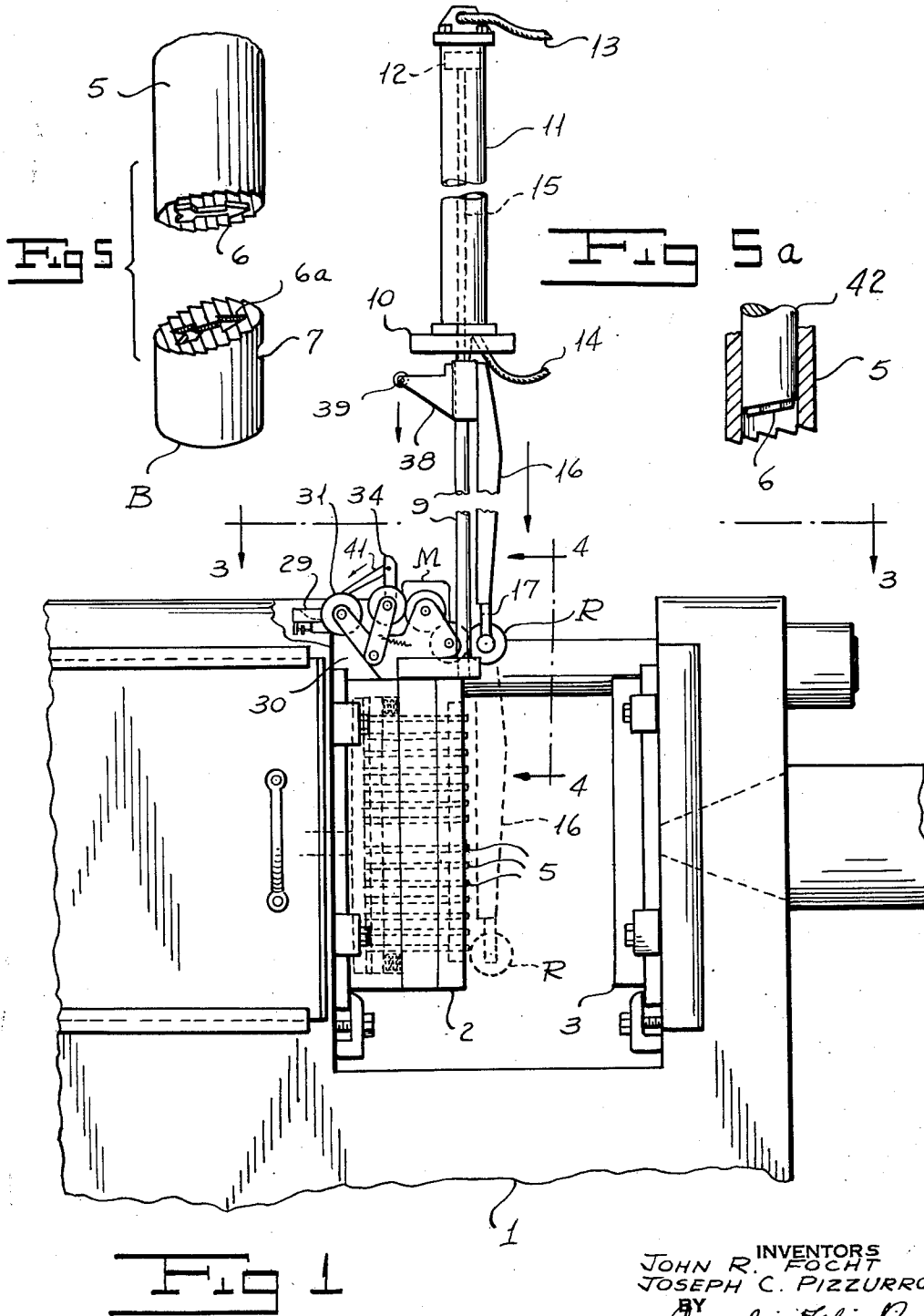
April 10, 1962

J. R. FOCHT ET AL
METHOD AND APPARATUS FOR FORMING DIRECTIONAL AND OTHER
INDICIA ON VALVE OPERATING BUTTONS AND CAPS
FOR PRESSURIZED DISPENSERS

3,028,629

Filed May 18, 1959

5 Sheets-Sheet 1



INVENTORS
JOHN R. FOCHT
JOSEPH C. PIZZURRO
BY
Cornelius Fabris
ATTORNEY

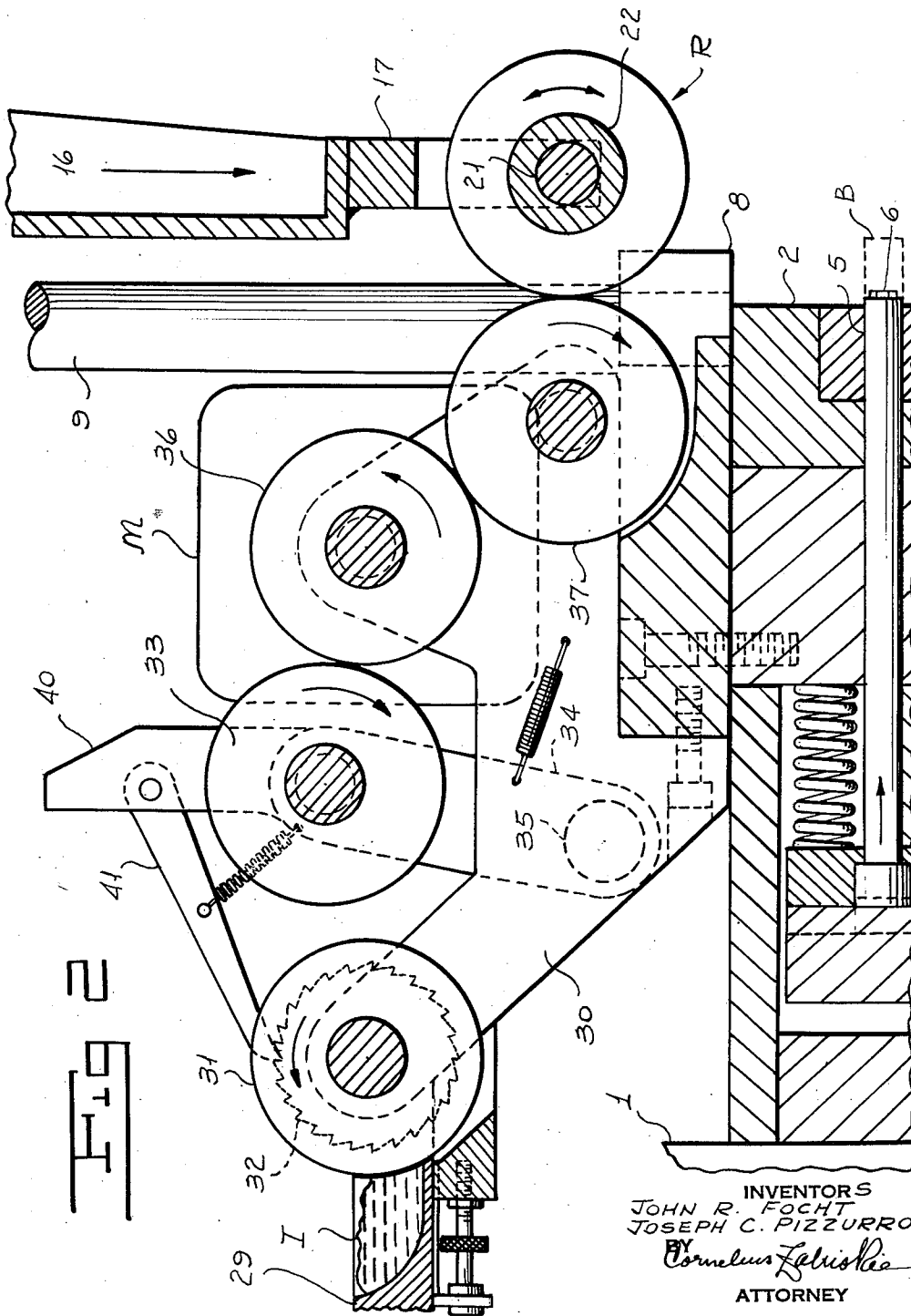
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INVENTORS
JOHN R. FOCHT
JOSEPH C. PIZZURRO
BY *Cornelius Fabrizio*
ATTORNEY

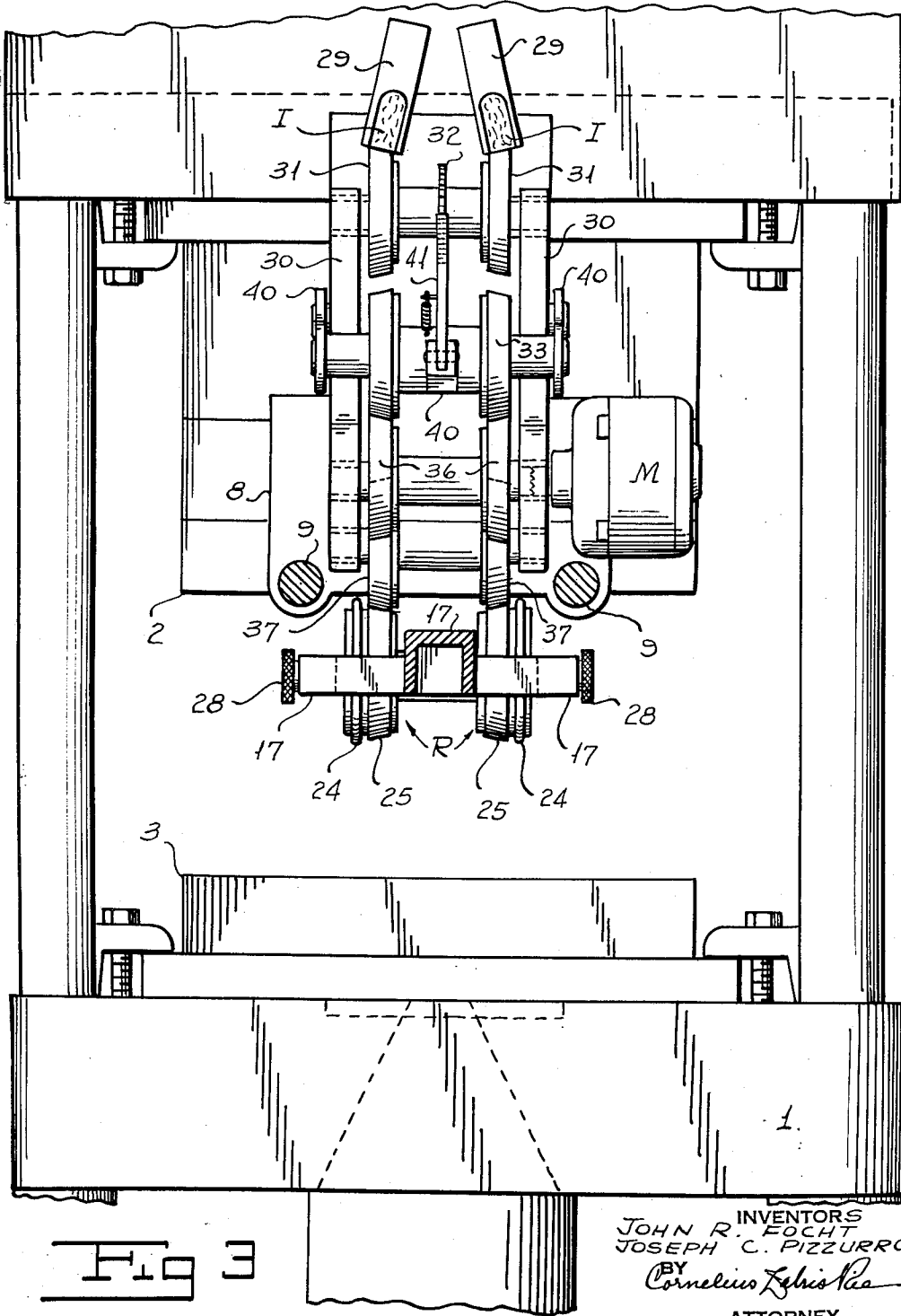
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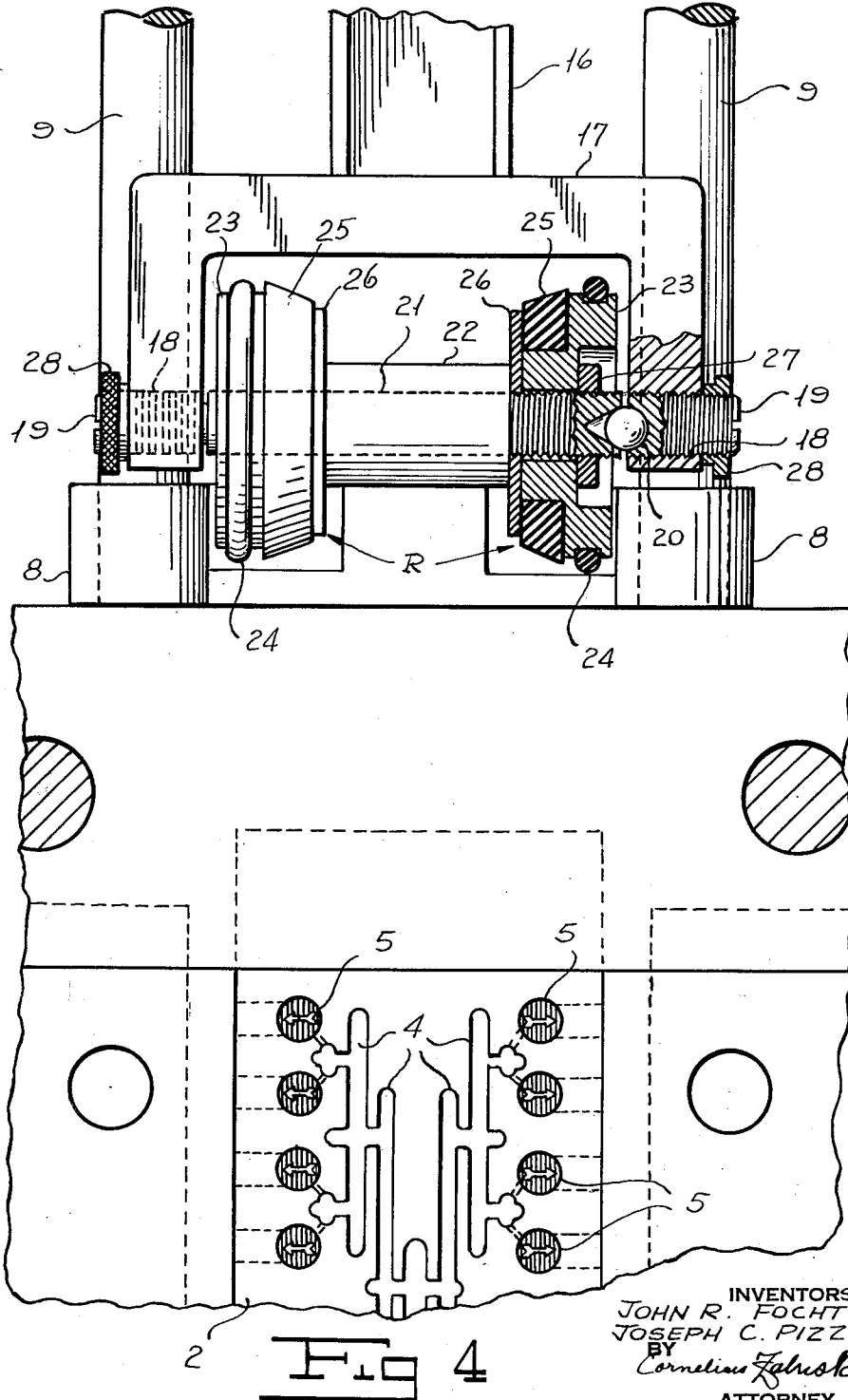
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INVENTORS
JOHN R. FOCHT
JOSEPH C. PIZZURRO
BY
Cornelius Fabroska
ATTORNEY

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Fig 6

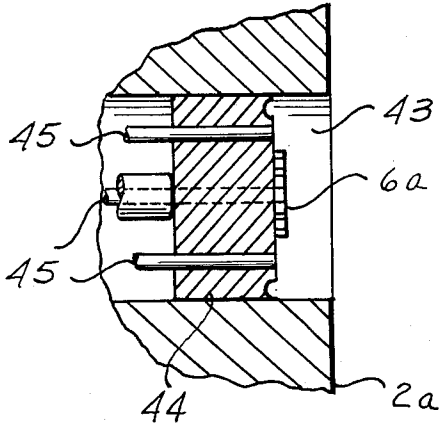


Fig 7

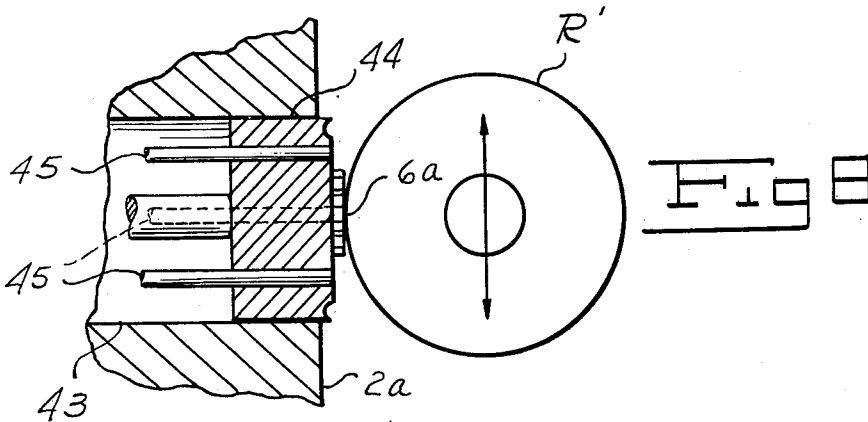
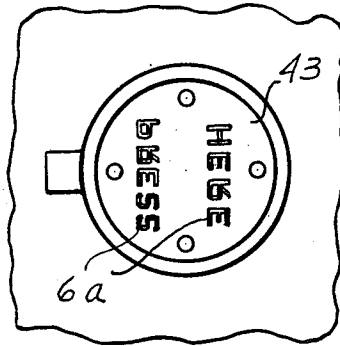


Fig 8

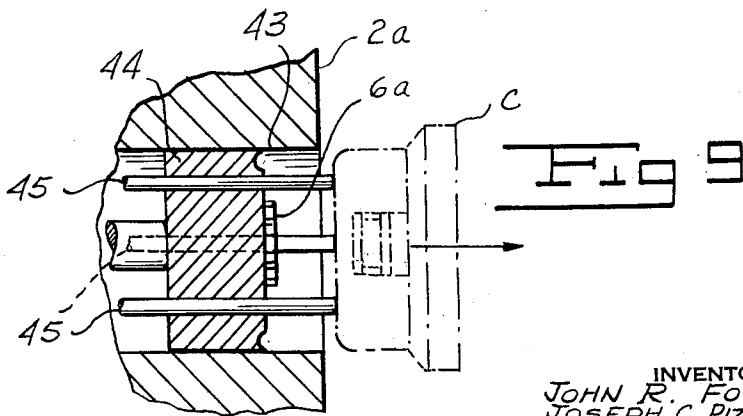


Fig 9

INVENTORS
JOHN R. FOCHT
JOSEPH C. PIZZURRO
BY
Cornelius Zaluska
ATTORNEY

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METHOD AND APPARATUS FOR FORMING DIRECTIONAL AND OTHER INDICIA ON VALVE OPERATING BUTTONS AND CAPS FOR PRESSURIZED DISPENSERS

John Richard Focht, Yonkers, and Joseph Charles Pizzurro, Scarsdale, N.Y., assignors to Precision Valve Corporation, Yonkers, N.Y., a corporation of New York

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This invention is a method of and apparatus for making a plastic valve operating button or cap for aerosol and other pressurized dispensers having thereon directional or other indicia which may be readily seen by the user of such a dispenser.

Aerosol dispensers, as commonly employed, consist of a container of material adapted to be dispensed through a valve with the stem of which is associated a manually operable push button or cap which, when depressed, opens the valve to permit the flow of the material from the container through a nozzle or other outlet. During the dispensing operation, care should be exercised to insure that the outlet points in a predetermined and desired direction away from the user and toward the space or object to which the material is to be supplied. It has been the practice in dispensers of the character under consideration to provide the valve-operating button or cap with appropriate indicia, such as a directional indication or symbol, e.g., an arrow pointing in the direction in which the material will be dispensed. It has been the prior practice to simply mold the symbol on the top surface either in relief or in intaglio. However, such a symbol, being of the same color as the plastic which carries it, is difficult to see.

The primary object of this invention is to provide means whereby the indicia thus formed on the button or cap will be of different color than that of the surface in or on which it is formed so as to render said indicia clearly visible and readable by the operator. Any desired colors, as well as black and white, all of which are hereinafter referred to as colors, may be employed.

Buttons and caps for aerosol and other pressurized dispensers are commonly made by injection molding the same from hot thermoplastics in injection molding machines using molding dies with knock-out pins which, after the cast has been molded, serve to eject the cast from the die of the machine in which it remains when the dies are separated.

In carrying out this invention the indicia may be colored to contrast with the color of the plastic which carries it or the part of the button or cap in which the indicia is formed may be colored to contrast with indicia the color of which is the color of the plastic. In either case a molding replica of the indicia, to be applied to the button or cap, is formed upon some portion of the base of the mold cavity which may be projected beyond the face of the mold cavity while the members of the die couple in which the molding is to be made are separated. Mold cavities conventionally include a surface at the base of the cavity through which knock-out pins may extend for the purposes well known in the art. These pins are normally retracted during the molding operation and thereby constitute in effect a portion of the base of the cavity at this time.

According to this invention some portion of the base of the mold cavity, which may be either the free ends of one or more of the knock-out pins or some other part of the base of the cavity, is provided with a molding replica of the indicia to be applied to the button or cap. If the indicia of the button or cap is to be colored then color is

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applied to that portion of the base of the mold cavity which carries the indicia. If the indicia on the button or cap is to be of the same color as the plastic body of said button or cap then the coloring matter is applied to the base of the cavity around such molding replica. In any event color is applied as stated while the portion to be colored is projecting beyond the open side of the cavity and in accessible position for such coloring operation as hereinafter more fully described.

As a result of these operations and the mechanisms for performing the same, the button or cap is molded against the coloring matter which has been applied to the base of the cavity and consequently is incorporated, during the molding operation, into the molded button or cap, as the case may be, so that, when the same is removed from the die, it is provided with indicia in contrasting color to the color of the remainder of said button or cap.

Features of the invention, other than those adverted to, will be apparent from the hereinafter detailed description and appended claims, when read in conjunction with the accompanying drawings.

The accompanying drawings illustrate different practical embodiments of the invention, but the constructions therein shown are to be understood as illustrative, only, and not as defining the limits of the invention.

FIG. 1 is a fragmentary side elevation of an injection molding machine equipped with the present invention.

FIG. 2 is an enlarged vertical section of a portion of said machine.

FIG. 3 is a section of the machine shown in FIG. 1 taken on the line 3—3 of said figure.

FIG. 4 is a section on the line 4—4 of FIG. 1.

FIG. 5 is a perspective view showing a knock-out pin and an associated valve operating button.

FIG. 5A is a fragmental section of a modified form of knock-out pin.

FIG. 6 is a fragmental section through one member of a die couple appropriate for molding a valve operating cap. This figure shows the parts of this particular die in position to receive plastic during the molding operation.

FIG. 7 is an elevation from the face of the die of FIG. 6 looking into the cavity thereof.

FIG. 8 is a view corresponding to FIG. 6, but showing the parts of the die of FIG. 6 so positioned as to receive the coloring matter to be subsequently molded into the cap.

FIG. 9 shows the parts in position to remove the finished cap, with the latter illustrated in dot and dash lines.

Referring to the drawings, 1 designates the frame of an injection molding machine of conventional form having a die couple comprising dies 2 and 3 mounted for relative movement into and out of cooperating engagement with one another. In the form of the invention shown, multi cavity dies are employed with appropriate runners 4, as shown in FIG. 4, so as to simultaneously mold a number of plastic buttons B, such as illustrated in FIG. 5. The plastic is introduced into these dies in the conventional manner and, when the dies are separated, the several buttons, along with the plastic which has solidified in the runners, are removed from the die 2 by knock-out pins 5, one of which is associated with each cavity in said die. Each of the knock-out pins 5, shown in FIG. 5, is provided at its free end with a projecting portion 6, which is a molding replica of the indicia to be molded in the cast. It is here shown, for the purpose of illustration, in the form of an arrow. The remainder of the end of the pin is shown as inclined, but it may be flat or otherwise.

During the molding operation, one end of each button B is molded in contact with the contiguous end of the corresponding knock-out pin 5 and thus the button is

molded with a depressed arrow shaped cavity 6a in that end of the button. FIG. 5 shows that the arrow points toward the side of the push button whereat is located the discharge opening 7 of the button.

Buttons, such as described, have heretofore been made in the manner indicated, but have been unsatisfactory because the directional indication is not as clearly visible as it should be. According to the present invention the arrow is of a color to contrast with the color of the surrounding portion of the plastic of which the button is formed. This we accomplish by applying coloring matter to the projecting portion 6 of the knock-out pin 5 while the dies are separated, as shown in FIG. 1, so that the arrow symbol 6a will be incorporated in the resulting cast in a corresponding color. This may be conveniently and efficiently accomplished by the color applying mechanism shown in the accompanying drawings and next described.

Mounted on the upper portion of the frame of the machine or on the die 2, is a base plate 8 shown best in FIGS. 2 and 4. This plate carries two spaced apart upstanding guide rods 9 to the upper ends of which are affixed a shelf 10 on which is supported an upright air cylinder 11. In this cylinder is a double acting piston 12 adapted to be raised and lowered by compressed air, alternately delivered to the respective ends of the cylinder through tubular connections 13 and 14. The piston has a stem 15 extending downwardly through the shelf 10 and connected to the lower end of this stem is a bar 16 carrying at its lower end a yoke 17 which is vertically reciprocated as the piston 12 is raised and lowered.

In the opposite legs of the yoke 17 are alined threaded openings 18 in which are received threaded adjusting screws 19, the inner end of each of which is chambered to receive a ball 20 and these balls extend into the re-entrant opposite ends of a shaft 21, as shown best in FIG. 4. On the opposite ends of this shaft are supported two color applying rolls R which are spaced apart by an interposed collar 22. Each roll comprises a core 23 carrying a rubber O-ring 24 and stepped down to support a color applying annulus 25 of rubber or other suitable material, the circumferential surface of which is inclined to cooperate with the inclined surfaces of the pins of one of the two vertically disposed rows of knock-out pins shown in the lower portion of FIG. 4.

A washer 26 is interposed between each core 23 and the corresponding end of the collar 22 and a nut 27 screwed onto the threaded end of the shaft 21 firmly clamps the color applying annulus in position. The advantage of this construction is that the shaft 21 and all parts mounted thereon may be readily removed from the yoke by backing off the screws 19. These screws also permit of adjustment of the rolls R in a direction axially of the shaft 21 in order that they may properly register and coact with the two rows of knock-out pins 5. When the parts are in adjustment as shown in FIG. 4, clamping nuts 28 are tightened on the screws 19 and serve to hold the parts in assembled adjusted relation.

The upstanding posts 9 are so located, with respect to the vertical face of the die 2 that vertical reciprocation of the air operated piston 12 will cause the rolls R to be raised and lowered over the face of the die 2 with the O-rings 24 riding over the face of said die and serving to properly space said rolls from said face. Said rolls thus roll over and contact with the outer surfaces of the projecting arrows 6 on said knock-out pins, so that coloring matter on the annuli 25 of the rolls R may be deposited on said surfaces of the arrows.

Coloring matter is applied to the annuli 25 of the rolls R by the mechanism shown best in FIG. 2. The coloring matter used in this connection may be of any suitable transferable character, such, e.g., as high viscosity lithographing ink or metallic or non-metallic colors which are preferably water insoluble. Such coloring matter,

indicated at I in FIG. 2, is contained within a fountain 29 adjustably supported on spaced apart upstanding flanges 30.

Mounted between said flanges 30 are companion rotatable rolls 31 having a common hub and rigid with said hub is a ratchet wheel 32. Mounted on a pin 35 extending between said flanges is a pivoted arm 34 movable to bring transfer rolls 33 supported thereon, into and out of contact with the rolls 31. Said rolls 33 are, however, normally in contact with companion color distributing rolls 36 which in turn contact with companion color distributing rolls 37. Each pair of rolls 33, 36 and 37 have a common hub.

All of the rolls 31, 33, 36 and 37 are spaced apart to correspond with the spacing of the rolls R and the rolls 37 are so positioned that the vertical travel of the color applying rolls R will bring them into contact with the rolls 37 as said rolls R are raised and lowered. All of said rolls moreover have inclined color carrying surfaces corresponding to the inclination of the color applying surfaces of the rolls R carried by the bar 16.

It will be noted from FIG. 1, that the bar 16 is provided with a bracket 38 vertically movable with said bar and carrying a roller 39 which, as the bar 16 descends, engages with the inclined surface 40 of the pivoted arm 34, to move said arm in an anti-clockwise direction, as viewed in FIG. 2, so that a pawl 41 carried by said arm will rotate the rolls 31 through an increment of rotation each time that the bar and its color applying rolls R descend. The color distributing rolls 36 are driven through appropriate speed reduction gearing from an electric motor M.

With this arrangement, the color picked up by the rolls 31 from the fountain 29 will be periodically applied to the surface of the transfer rolls 33 and transferred by said rolls to the rolls 36 and from the rolls 36 to the rolls 37 for the rolls 33 and 37 are frictionally driven from the rolls 36. As the color is passed from the rolls 33 to the rolls R of the yoke, said color will be thoroughly distributed over the surfaces of the rolls 33, 36 and 37, and uniformly applied to the rolls R as the latter descend to travel over the exposed faces of the knock-out pins for the purpose of applying color to the latter.

The operations of the air cylinder 11 are so timed, in any appropriate manner, that the rolls R will roll downwardly over the arrows on the knock-out pins while the dies 2 and 3 are separated, as shown in FIG. 1, and after the previous cast has been removed from the die 2 and that said rolls R will move upwardly out of the path of the dies before the dies are closed for the molding operation. The plastic is thus fed to the dies while the arrows on the knock-out pins are coated with the coloring matter. Consequently the buttons are molded about said coloring matter and, when removed from the dies at the conclusion of the molding operation, will embody a depression corresponding to the molding arrow 6, colored according to the coloring material contained in the fountain 29. Buttons molded of white plastic may have arrows colored black or of any color contrasting with the white or any other color of the body of the button, or vice versa.

In the foregoing detailed description of the apparatus shown in the drawings the indicia will be formed in intaglio in the end product and will be of a color contrasting with the color of the plastic in which it is cast. However, the reverse may be carried out with the machine of the present invention by making the central portion of each knock-out pin in the form of a smaller supplemental pin 42, as shown in FIG. 5A, said pin being provided at its forward end with the arrow 6 in relief. In such cases, the supplemental pin 42 will be connected to the molding machine in such manner as to be withdrawn slightly during the color applying operation, so that the color will not be applied to the projecting molding portion 6. When this is done the color will be applied to the free end of the knock-out pin without applying the color to the portion thereof which molds the indicia. As a result, the

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indicia will be molded in the end product in the color of the plastic introduced into the mold, while the color in the remainder of each knock-out pin will be applied to the end of the button or cap, so as to surround such indicia and produce the contrast to which we have referred.

The same effect may be obtained by making the arrow 6 on the knock-out pin 5 in the form of a depression in which case color will be applied to the pin only over the surface around that depression with the result that the arrow will be cast on the button or cap in relief in the natural color of the plastic while the surrounding surface of the cast will be of contrasting color.

We have hereinbefore referred, for the purpose of illustration, to an arrow as an example of the indicia. However, such indicia may be any other symbol which may be used either by itself or in conjunction with other symbols or words. For example, either a cap or a button might have applied to its top surface the words "Press Here" either with or without an arrow or another symbol without departing from this invention.

In FIGS. 1-5 inclusive of the drawings, there is illustrated details of construction for the formation of valve operating buttons. In FIGS. 6-9 a die structure is shown for molding a valve operating cap. The die shown in these figures is indicated generally by the reference character 2a and corresponds to the die 2, hereinbefore described. This die 2a has a cavity 43, the base of which is formed by a plunger 44 through which extend knock-out pins 45. The raised printed character, which corresponds to the arrow 6 of FIGS. 5 and 5a, is shown in FIGS. 6 and 7 as comprising two words "Press Here," indicated at 6a. The knock-out pins 45 are connected to the operating parts of the machine in the usual manner to be reciprocated in timed relation to operations of the die and the plunger 44 is provided at its back with an operating stem 44' synchronously reciprocated through similar connections. The normal position of the parts to receive the plastic in the cavity 43 when the die couple is closed, is shown in FIG. 6.

The first step of the method of this invention is for the plunger 44 to move to the right from the position shown in FIG. 6 to the position shown in FIG. 8, wherein the free end of the plunger 44 occupies a position beyond the line of parting of the dies of the couple and thus projects beyond the face of the die 2a, with the molding character 6a in exposed position to be acted upon by a color applying roll R' which corresponds to one of the rolls R of FIGS. 1-5. The roll R', however, instead of having an inclined face, is provided with a transversely flat face, so that it may roll freely over the molding character 6a for the purpose of applying coloring matter thereto. Said roll R' may be operated in the same manner and by the same mechanism as shown in FIG. 1.

After color has been applied to the character 6a, and the roll R' withdrawn in an upward direction, both the plunger 44 and the knock-out pins 45 are withdrawn to occupy the positions shown in FIG. 6. The die couple is then closed and plastic is injected into the dies. Thereafter the member of the die couple corresponding to the die 3 is withdrawn to open the couple and immediately thereafter the knock-out pins 45 move forwardly to eject the finished molded cap C from the cavity 43 as shown in FIG. 9.

An important advantage of this invention is that it may be incorporated in a conventional injection molding machine without affecting the normal operation of such machine, without slowing up said operation, and by the employment of relatively simple mechanism in conjunction with such machine. The resulting button or cap has the desired indicia incorporated therein, with contrasting coloring so as to be visually clear indefinitely.

The foregoing detailed description sets forth this invention in its preferred practical form, but the invention is to be understood as not limited to the specific construc-

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tions shown in the appended drawings and is to be understood as fully commensurate with the appended claims.

Having thus fully described the invention, what we claim as new and desire to secure by Letters Patent is:

1. Method of forming legible indicia on a valve operating button or cap body during injection molding thereof in an injection die couple equipped with a cavity having therein a movable base with knock-out pins extending therethrough, said method comprising the following steps: first moving the base of the mold cavity of one member of the die couple to project the base of such cavity beyond the line of parting of said couple, then applying color to at least a portion of the projecting part of said base, then retracting said base into the interior of the die cavity, then closing the die couple, then introducing injection molding plastic into said couple, thereafter opening said couple and then operating the knock-out pins to eject the resulting molded part.

2. Method of forming indicia on a valve operating button or cap body during injection molding thereof in an injection die couple equipped with a knock-out pin which comprises: applying transferable coloring matter to the knock-out pin prior to the molding of such body and while the outer end of said pin is projecting beyond the face of the die on which it is mounted, and thereafter retracting said pin and molding said body against the colored end of the knock-out pin whereby the coloring matter is applied to the body as it is cast.

3. Method of forming indicia on a valve operating button or cap body during injection molding thereof in an injection molding die couple equipped with a knock-out pin having on its cast engaging surface a molding character which comprises: applying transferable coloring matter to a selected portion of the cast engaging end of said knock-out pin while the die couple is open and while said end of said pin is projecting beyond the face of the die on which it is mounted, thereafter retracting said pin and closing the die couple, thereafter injecting plastic into the closed die couple to cast the body therein and transfer to such body the color previously applied to the knock-out pin, thereafter opening said couple and removing the resulting cast body therefrom.

4. An injection molding machine having a die couple one of which dies is provided with a cavity, the improvement which comprises: in said cavity a base portion movable to a position to project a portion of the base beyond the parting line of the die couple, said portion being provided at its outer end with a molding portion shaped to correspond to predetermined indicia, a color applying means mounted to traverse said molding portion to apply transferable color thereto, and said base being retractable into the die cavity to provide molding space therein for plastic material.

5. An injection molding machine having a die couple one of which dies is provided with a cavity, the improvement which comprises: a base portion provided with a molding portion shaped to correspond to predetermined indicia, means for moving said base portion from a position within the cavity to a position wherein the molding portion will project beyond the open side of the cavity and vice versa, a color applying roll mounted to roll over said molding portion while the latter projects beyond the cavity, means for operating said color applying roll, and means for supplying color to said roll.

6. An injection molding machine according to claim 5, wherein the means for operating the color applying roll comprises a power cylinder connected to the roll, and a guide roller associated with the color roll and adapted to roll over the face of said die to guide the color applying roll in its travel over the molding portion of said base.

7. Method of forming indicia on a valve operating button or a cap body during injection molding thereof in an injection die couple having a mold cavity, which comprises: shifting at least a portion of the base of the mold cavity having thereon a casting character corre-

sponding to the indicia to be applied to said body into a position to project said base portion beyond the parting line of said die couple, applying transferable color to said base portion of the cavity while said base portion is in projected position, then retracting said base portion into molding position within the cavity, thereafter molding said body in said cavity against the transferable color therein whereby said color is transferred to the body as it is cast, and thereafter ejecting the resulting cast body from the cavity.

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