

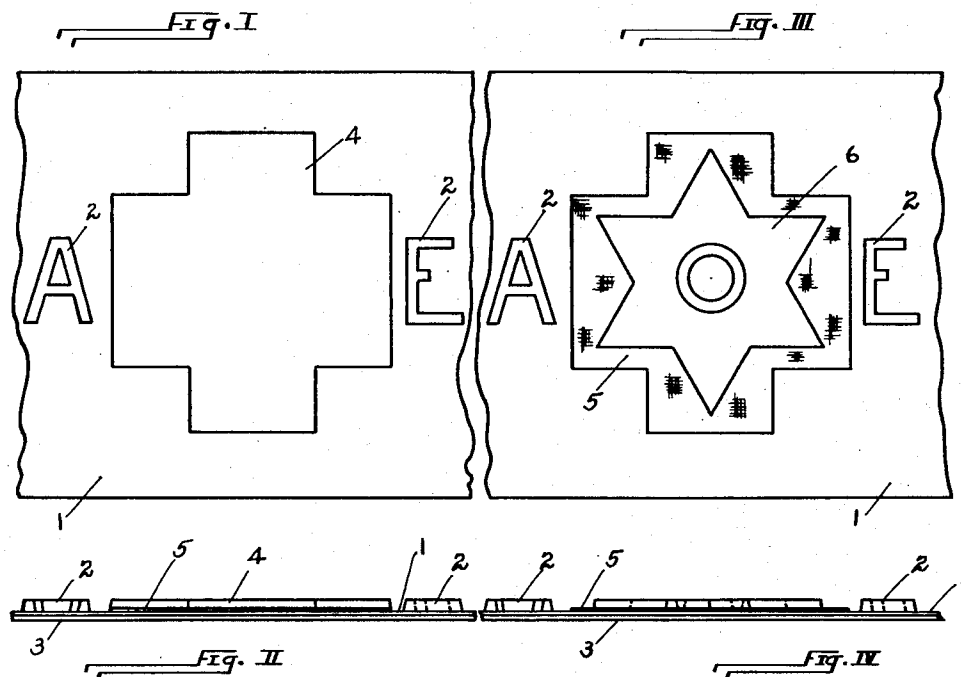
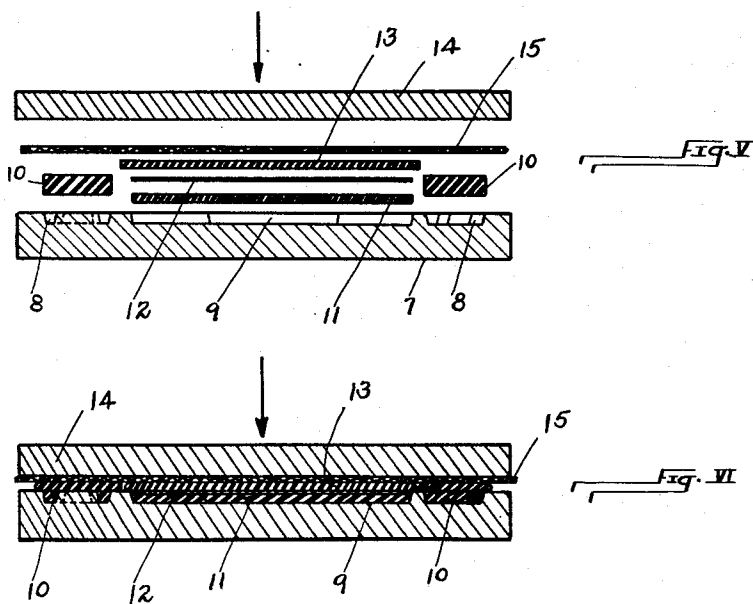
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RUBBER DIE

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RUBBER DIE

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This invention relates to improvements in rubber printing dies or blocks, and to improvements in the production of the printing dies or blocks.

The rubber printing dies or blocks to which the improvements apply are dies or blocks shaped in the form of flexible sheets which, after shaping, are mounted on rigid carriers, perhaps plane-surfaced, but ordinarily cylindrical. Thus a rocking or rotary printing block is formed, useful, for example, for printing legends upon paper cartons. I cite this particular instance for the use of printing dies or blocks by way of example, and do not exclude from the field of utility many other and varying particular uses.

The invention has to do with the problem of providing dies for the production expeditiously and cheaply of printed cartons and the like, where the printed matter includes both standard characters, such as letters of the alphabet and numerals, and also characters that are non-standard and unique, such as trade-marks, for example. The usual practice in preparing dies for the printing of standard characters is to set type in a form and, using the form as a matrix, to make a mold, in which the characters are reproduced in intaglio; and then to shape the rubber die in the mold so formed. When it comes to the preparation of a die for the printing of a non-standard and unique character there are two procedures available: one is to engrave the character (ordinarily in wood) and, using the special wood-cut precisely as the standard type is used, to continue in the manner already described. The other procedure is to prepare a suitable blank die faced with rubber of engravable nature (different in nature from rubber that is used in making a molded die, and not itself moldable) and then to engrave the character in relief upon the face of that blank, in like manner as in the procedure first described the character is engraved in the block of wood.

When it comes to producing cartons and the like that bear printed upon them matter of mixed nature, including both standard characters and characters that are unique, problems arise, and it is in a solution of those problems that my invention is found.

It is quite possible, of course, to engrave the whole in the face of a blank die of engravable rubber; but, since the work of engraving is hand work, such procedure would ordinarily be too expensive to permit of its use. Again, it is quite possible to produce two dies; one a molded die, that shall bear the standard character, and the other an engraved die, that shall bear the unique

character; and to combine these into one die by affixing the molded die to the engraved die by cementing or other means, but this in many cases is too costly.

My invention is realized in integrating in the substance of a molded die, in the face of which in usual manner the desired standard character is molded, and in the same molding and vulcanizing operation in which the standard character is formed and vulcanized, an inlaid panel of engravable rubber simultaneously vulcanized, whose face shall in the vulcanized sheet extend in common plane with the face of the molded character, and thereafter to engrave in the face of that panel the desired non-standard and unique character.

In the accompanying drawing, Fig. I is a plan view of my composite, flexible die or block, showing a plaque of engraving rubber associated with a molded legend in the die, the plaque of engraving rubber being mounted for engraving, but unengraved.

Fig. II is a side elevation of the die or block as shown in Figure I.

Fig. III is a plan view similar to Fig. I, but showing the plaque of engraving rubber actually engraved to provide a particular design.

Fig. IV is a side elevation of the die or block as shown in Fig. III.

Fig. V is a cross-sectional, exploded view through a mold for making the die and the elements composing the composite die, illustrating a step in the production of my composite rubber die or block.

Fig. VI is a similar view illustrating the molding operation by which the molded legend of the rubber die or block is formed, and the plaque of engraving rubber is integrated with the molded portion of the composite die or block.

Referring particularly to Figs. I to IV, inclusive, of the drawing, reference numeral 1 designates the rubber base of the die or block, and reference numeral 2 designates portions of a molded legend on said base. Vulcanized to the rearward or under face of the rubber base 1 is a flexible backing element 3, which is desirably of some stout, but flexible, fabric such as a heavy twill.

Fig. I of the drawing shows an unengraved plaque 4 of a grade of rubber suitable for engraving, which plaque is secured by vulcanization to a layer 5 of friction fabric incorporated in the body of the die. The plaque of engraving rubber has its exposed face, as will be apparent in Fig. II of the drawing, in the approximate plane

of the printing faces of the characters 2 which compose the molded legend.

Fig. III illustrates the cutting of a device 6 from the plaque 4 of engraving rubber. As will be noticed in Fig. III, the cutting of the device is facilitated by the fact that it may be cut wholly through its thickness against the underlying layer of friction fabric 5. As shown, a simple device has been cut in the plaque of engraving rubber. Obviously, however, other and more intricate devices may similarly be cut, and, if desired, an additional legend may be applied to the device, or the plaque used solely to carry one of a number of alternative legends, without change in the main die legend provided by the molded characters 2.

Figs. V and VI of the drawing illustrate the integration of the plaque for engraving with the remaining elements of the die or block. Referring particularly to the exploded view of Fig. V, reference numeral 7 designates a mold having therein intaglio impressions 8 for the molding of the characters 2, and a less specialized inset region or bed 9 for the reception of the engraving rubber to form the plaque 4. The bodies which are to form the die or printing block comprise blocks 10 of molding rubber, which are shown as presented to the intaglio character-forming regions 8 of the mold. It will be noted that these blocks are of substantially greater depth than the mold impressions which are to form the characters, and that they comprise an excess of material over that required for the characters. A relatively thin body of engraving rubber 11 is shown as presented to the inset depression or bed defining the plaque for engraving. At the outer face of the body 11 of engraving rubber there is shown in Fig. V a layer 12 of friction fabric, and beyond that a sheet 13 of molding rubber. Lying between these various elements and a presser plate 14 associated with the mold, there is shown the backing sheet 15, which, as mentioned above, is desirably of some fabric such as a heavy twill.

In integrating the printing die or block, presser plate 14 is brought to bear upon the various elements arranged substantially as shown in Fig. V, and an adequately high temperature to flow the molding rubber is supplied to the mold. In this step of actual molding integration, the body 11 of engraving rubber is pressed into the depression 9. It should be noted that this rubber does not readily flow for molding as do the other bodies of rubber incorporated in the die, and it is, therefore, of approximately the size and shape desired for the plaque 4. As the elements are pressed and heated, body 11 takes the form of the impression or bed 9, with, however, but little change in its thickness and plan contour. The bodies 10 of molding rubber, however, are caused not only to fill the intaglio impressions 8, but are also spread to provide the continuous rubber base 1 of the die, joining and becoming integral with the sheet 13 of rubber which is presented outwardly of the fabric backing 15. As the engraving rubber 11 is softened to an appreciable extent, the friction fabric 12 becomes bonded to its rearward face and is securely bound thereto by the rubber of sheet 13. The rubber of sheet 13, and the rubber of blocks 10, the excess of which flows into union with sheet 13, together bond with the backing fabric to form the base 1 of the finished die.

Fig. VI of the drawing illustrates particularly the integration of the rubber die or block by molding and vulcanization, the excess rubber from

blocks 10 and the rubber of sheet 13 being shown as integrated to provide the continuous rubber base 1 which secures the printing elements of the die to the flexible backing sheet 3. It should be understood in this connection that the rubber sheet 13, which lies between the special backing 5 of friction fabric for the engraving rubber, and the fabric of the backing sheet, may desirably be of a soft rubber which possesses high cementing properties under vulcanization, as the rubber of such grade both secures itself with particular firmness to the backing fabric, and also integrates itself along its edges most adequately with the excess rubber from the character blocks 10. Clearly, instead of using a free sheet of cementing rubber, such as the sheet 13, green rubber of a cementing grade may be spread over all, or a portion, of the fabric backing prior to molding and vulcanization. It has been noted that the body of plaque 4 is relatively thin, and also that it merely fills the mold impression 9 during integrating vulcanization. The engraving rubber of which this plaque is made is recognized generally in the art as a rubber having such degree of hardness that it does not to an appreciable degree flow under vulcanization, although it does so soften as to form a bond. It has also been noted that the printing face of the plaque 4 lies approximately, and effectively, in the plane of the printing faces of molded characters 2. Whether the integrating body of rubber lying behind the sheet 11 which forms the plaque be, as shown, a free sheet 13, or whether it be, as suggested, a body built up on the backing sheet, it serves as a "build-up", bringing the free face of the plaque into an approximation to the plane in which the printing face of the molded character lies.

It will be understood that with the die elements and molding press members organized as in Fig. VI, the vulcanizing step is carried to its normal completion. This vulcanization, together with the molding, produces, as explained, a wholly integrated, flexible rubber die of composite nature, comprising molded characters and a plaque of engraving rubber for subsequent engraving, to provide an engraved device, an engraved legend additional to the molded legend, or an engraved device bearing an engraved additional legend.

The die is completed by the engraving of the panel 4 of engraving rubber, as diagrammatically indicated in Figs. II and IV.

The characteristics of a printing die engraved in engraving rubber are different from those of a printing die of moldable rubber shaped in a mold. Essentially, moldable rubber is compounded with the capacity in view of flowing under heat and pressure and filling a mold; engraving rubber is compounded with the capacity in view of lending itself to the cutting operation and affording a solid sharp print. Furthermore, the edge of the character engraved in engraving rubber is sculptured from the body of the block; the edge of the molded character is shaped under pressure. And because of such differences in condition and circumstance the engraved character is as a printing character superior. It is only for reasons of economy that so far as possible these dies are molded in reproduction of standard master type.

I claim as my invention:

1. The herein described method of producing a flexible composite rubber die which comprises positioning at a character-forming mold cavity

a block of rubber flowable under vulcanization of volume adequate to form a molded character and to provide an excess for lateral flow, positioning at an adjacent mold cavity a body of engravable rubber deficient in moldability and having approximately the dimensions of the mold cavity in which it is set, positioning a sheet of rubber flowable under vulcanization over said body of engravable rubber and in edge adjacency with said flowable block, and molding the said assembly under vulcanizing conditions to a flexible backing sheet, said several rubber elements under the forces for forming a molded character from said flowable block and under the temperature conditions of vulcanization being united to produce with each other and with the flexible backing sheet an integral, flexible, composite die having vulcanized union between the several elements thereof.

2. The herein described method in accordance with the procedure of claim 1 comprising additionally integrating into the assembly a backing of friction fabric for limiting the depth of an engraving cut immediately behind the engravable plaque by effecting vulcanized engagement of said friction fabric both to the said engravable plaque and to the said flowable body of rubber.

3. A composite integrated rubber printing die comprising a flexible backing sheet, a molded character in bonded union with the backing sheet presenting a printing face spaced from the backing sheet, a plaque of engravable rubber having a thickness less than the thickness of the said molded character and having bonded union therewith, and an integrating body of rubber softer than the engravable plaque lying between the engravable plaque and the backing sheet in bonded union with the plaque and with the backing sheet, said engravable plaque as spaced from the backing sheet by said integrating body of rubber having its free face lying approximately in common plane with the printing face of said molded character.

4. A composite integrated rubber printing die comprising a flexible backing sheet, a molded character in bonded union with the backing sheet, a plaque of engravable rubber in bonded union with the said molded character, an integrating body of rubber lying between the engravable plaque and the backing sheet in bonded union with the backing sheet and with the molded character, and a backing of friction fabric for limiting an engraving cut to the depth of the engravable plaque in bonded engagement with the said engravable plaque and the said integrat-

ing body of rubber, the free printing faces of said molded character and said engravable plaque lying approximately in common plane.

5. A composite integrated rubber printing die comprising a flexible backing sheet, a molded character in bonded union with the backing sheet presenting a printing face spaced from the backing sheet, a plaque of engravable rubber having a thickness less than the thickness of the said molded character and having bonded union therewith, an integrating body of rubber softer than the engravable plaque lying behind the said engravable plaque in bonded union with the said backing sheet and with the said molded character, said engravable plaque as spaced from the backing sheet by said integrating body of rubber having its free face lying approximately in common plane with the printing face of said molded character, and a backing of friction fabric for limiting the depth of an engraving cut to the depth of the engravable plaque lying immediately behind the plaque in bonded engagement with the plaque and with said integrating body of rubber.

6. The method herein described of making a flexible printing die which consists in simultaneously shaping, uniting, and vulcanizing a compound sheet of rubber including a portion formed of rubber of moldable quality bearing a printing character molded in relief upon it and a portion formed of rubber of non-moldable but engravable quality with plane surface, and engraving a printing character in relief upon the portion of engravable quality.

7. The method herein described of making a flexible printing die which consists in simultaneously shaping, uniting and vulcanizing a compound sheet of rubber including a portion formed of rubber of moldable quality continuous throughout the extent of the sheet and bearing a printing character molded in relief upon it, and a portion formed of rubber of non-moldable but engravable quality united to the continuous portion first named upon one side thereof and having a plane surface, and engraving a printing character in relief upon the portion last named of engravable rubber.

8. A rubber printing die including a body of moldable rubber bearing integrally in relief a printing character having the characteristics of a molded article, and carrying in vulcanized union with itself an inlay of engravable rubber, such inlay bearing in relief a printing character having the characteristics of an engraved article.

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