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Courier Press, Leamington Spa, England.

Description

This invention relates to multi-colour printing. The invention is especially, but not exclusively, applicable to the printing of articles of ceramic ware but may be used for printing other articles. The term "multi-colour" is used herein to refer to the application of two or more colours.

Multi-colour printing of articles is effected by applying individual colours to the article successively. For this to be effective it is essential that precise registration is achieved between the successive printings otherwise the image will become distorted.

From US—A—3990364 a multi-colour printing apparatus for use in the ceramic industry has been known in which four screen units, each provided with a doctor, are horizontally arranged in juxtaposition for applying four different colours of a multi-colour image. Below the screen units a conveyor belt circulates in a vertical plane. Intermediate carriers are arranged on this conveyor belt in such manner that they can be pivoted through an angle of 90°. The intermediate carriers are equidistant from one another, as are the screen units, and can be guided with precision under the screens. Below the conveyor belt an article conveyor is also arranged in a vertical plane. The articles—plates—are equidistantly arranged on this conveyor. On one side the article conveyor extends beyond the conveyor belt for intermediate carriers so that a colour-receiving position is provided for the articles wherein they are not covered by the intermediate carrier conveyor belt and can be detained in this position. The conveyor belt can be stopped for each intermediate carrier in a colour transfer position. The intermediate carriers can be swung downwardly through 90° over the article which is in the colour-receiving position. After this pivoting movement, a pressure pad driven by a driving mechanism presses the intermediate carrier on to the article in order to transfer the colour from the carrier to this article. The article conveyor moves through a drying kiln in which the colour extract is caused to adhere firmly to the articles. The intermediate carriers are pressed into engagement with successive ceramic articles at said printing station to apply a different colour extract to each of said ceramic articles. This is followed by the step of drying said ceramic articles after each of the different colour extracts is applied to said ceramic articles. Subsequently, the ceramic articles are sequentially returned to said printing station again and a different one of said intermediate carriers is being pressed onto each individual ceramic article. This procedure is being repeated until all colours have been applied to each individual article. This causes substantial registration problems.

It is an object of the present invention to obviate or mitigate this disadvantage.

The invention provides multi-colour printing apparatus comprising a vertically movable non-rotatable printing member, a support for ware to be decorated locatable in a position beneath the printing member and a plurality of transfer members disposed angularly around the central vertical axis of said printing member at a level between same and said ware support, the transfer members being sequentially movable into positions between said printing member and said ware support whereby to permit transfer of printed images therefrom to said printing member for subsequent application to ware mounted on said support.

Preferably said transfer members comprise generally flat plates on which is etched or engraved a portion of the pattern or decoration to be applied to the articles of ware, each transfer member being provided with doctor means and control means being provided to effect doctoring of each plate during transfer to the ware of the image from the preceding plate.

Preferably also said doctor means is operable following transfer of an image from the associated plate to re-ink the plate in readiness for the next operating cycle. For this purpose the doctor means preferably incorporates a doctor blade mounted for pivotal movement between inking and doctoring positions and adapted for bodily movement relative to the associated plate in both operative positions of the latter.

Preferably also each of said transfer members incorporates controllable heating means operable to maintain the transfer member at a temperature which will ensure complete transfer of heat sensitive inks from the transfer member to said printing member during operation.

Preferably said ware support is mounted on a carriage arranged to be horizontally movable between a decorating position disposed vertically beneath said printing member and a loading and unloading position convenient to a machine operator. For this purpose the ware support may be slidably movable in a direction radially of said printing member in an angular direction intermediate the angular positions of adjacent ones of said transfer members. The ware support preferably incorporates means for centring ware mounted thereon and for securing the centred ware against movement during operation.

Preferably said printing member comprises a pad of deformable material such as silicone.

An embodiment of the invention will now be described, by way of example only, with reference to the accompanying diagrammatic drawings, in which:

Fig. 1 is a sketch illustrating the general arrangement of the principal components of a multi-colour printing apparatus according to the invention;

Fig. 2 is a vertical section through the apparatus showing one printing station;

Fig. 3 is an enlarged perspective view of a doctor mechanism incorporated in the apparatus;

Figs. 4A to 4D illustrate the sequence of operation of the doctor mechanism;

Fig. 5 is a vertical cross section through a transfer member incorporated in the apparatus;

Fig. 6 is an exploded perspective view showing the components of the transfer member of Fig. 5;

Fig. 7 is a perspective view of a ware support incorporated in the apparatus; and

Figs. 8A to 8D illustrate the operation of the printing cycle.

Referring to Fig. 1 the apparatus incorporates a central vertically movable printing member 10 in the form of a deformable silicone pad beneath which a ware support 11 is mounted. Four transfer members 12A to 12D are disposed angularly around the axis of movement of the printing member 10 at a level between the printing member 10 and the ware support 11 and are arranged to be slidably movable in turn into positions between the printing member 10 and the ware support 11 whereby patterns printed on each of the transfer members in different colours may be picked up by the printing member 10 in turn and following withdrawal of the transfer member applied to ware mounted on the support 11 by downward movement of the printing member.

Referring now to Fig. 2 the apparatus is shown in greater detail and comprises a support frame 15 on which the printing member 10, ware support 11 and transfer members 12A to 12D are mounted. Only the transfer member 12A is shown in Fig. 2. The printing pad 10 is carried by a rigid backing plate 16 having upwardly extending guides 17 slidably mounted in collars 18 fixed to the frame 15 of the machine. A hydraulic cylinder 19 is mounted above the pad 10 and between the guides 17 and has a piston rod 20 extending through the frame 15 and connected to the mounting plate 16. The cylinder 19 may be extended to move the pad 10 vertically downwards and retracted to withdraw it to the position shown in Fig. 2. During such movement the pad 10 is stabilised by the guide members 17 which also serve to prevent rotation of the pad. The pad is therefore constrained so that it may move in a vertical direction only and cannot rotate or move horizontally. An actuating member 21 mounted on one of the guides 17 is adapted to act on control valves 22 mounted vertically adjacent the guide 17 to effect operation of related parts of the equipment in the desired sequence during printing operations.

Each of the transfer members 12A to 12D comprises a carrier 25 supporting a generally flat metal plate 26 on which the design or pattern to be applied to the articles to be decorated is etched or engraved. The carrier 25 is slidably mounted on horizontal rails 27 and is adapted to be moved by operation of a hydraulic cylinder 28 between a retracted position shown in Fig. 2 and an extended position in which the transfer member is located between the printing pad 10 and the ware support 11. A doctor mechanism 30 is associated with the plate 26 and is operative to apply ink thereto and to scrape the plate so as to remove ink from the surface except in the areas of the etched or engraved pattern. A similar transfer member and doctor assembly is provided at each of the four locations 12A to 12D, all the plates 26 being engraved with portions of the pattern and each having a different colour of printing ink applied thereto during operation whereby successive colours are applied in sequence to appropriate regions of the pattern during the printing operation.

The doctor mechanism 30 is shown in greater detail in Fig. 3 and comprises a support or bridge member 31 extending across the path of horizontal movement of the engraved plate 26 and supporting a horizontal shaft 32 rotatably mounted in support blocks 33 and movable between alternative positions of use by a rotary actuator 34. A blade carrier 35 is mounted on the shaft 32 and carries a flexible doctor blade 36 of rubber or similar material which acts on the surface of the engraved plate during operation. Threaded adjustors 37 act between the bridge member 31 and support blocks 33 to provide for adjustment of the blade 36 relative to the surface of the plate 26 on which it acts.

The doctor mechanism 30 is arranged both to apply ink to the plate 26 and to scrape or doctor it so as to remove the ink from the high points of the plate 26 but leave it in the engraved or etched portions. The operation of the mechanism 30 is shown in Figs. 4A to 4D. Fig. 4A shows the rest position of the unit in which the blade 36 is in an inclined position such that its free edge is spaced slightly above the surface of the plate 26. The latter is adapted to be moved horizontally by means of the hydraulic cylinder 28 referred to previously and the doctor mechanism 30 is connected to a similar hydraulic cylinder 38 for movement parallel to the surface of the plate 26. In the position shown in Fig. 4A the cylinder 28 is retracted to maintain the plate 26 in its retracted inking position and the cylinder 38 is extended to position the doctor blade 36 in an outer position adjacent the outer end of the plate 26.

When actuated at the appropriate stage in the operating cycle the doctor blade 36 is first rotated into a vertical position in which it is pressed into close contact with the surface of the engraved plate which has been previously coated with printing ink. Cylinder 38 is then retracted to draw the blade 36 across the surface of the plate 26 thereby removing ink from the high points of the surface but leaving ink in the engraved recesses corresponding to selected areas of the pattern to be applied to the articles being decorated. This position of the apparatus is shown in Fig. 4B. Thereafter the cylinders 28 and 38 are simultaneously extended to move the plate 26 and scraper assembly to their extended positions in which the plate is disposed beneath the printing pad 10. No relative movement takes place at this stage between the plate 26 and the scraper blade 36 and subsequently the printing ink is picked up from the plate 26 by the printing member. Thereafter the blade 36 is moved to its inclined position and cylinder 28 is retracted to draw the plate 26 into its retracted position shown in Fig. 2. Relative movement thus takes place between the surface

of the plate 26 and the blade 36 and since the latter is in its tilted position this serves to spread a coating of printing ink introduced behind the blade 36 over the entire surface of the plate 26. The apparatus is then in the position of Fig. 4A ready for the next operating cycle.

Transfer of printed images from the plate 26 to the printing pad 10 and from the latter to the surface of the ware to be decorated is dependent on the temperatures of the surfaces in contact with the ink images at these different stages. In order to ensure complete release of the printing ink from the engraved plate 26 the latter requires to be maintained at a predetermined temperature. For this purpose the transfer member incorporates heating means. Referring to Figs. 5 and 6 the engraved plate 26 is mounted in a tray 40 by means of a clamping plate 41 acted on by adjustment screws 42. A heating unit comprising a top plate 43, a heater 44, an insulating plate 45 and a bottom plate 46 is clamped beneath the tray 40 and a temperature sensitive probe 47 is connected to the heater 44 and to control means operable to maintain same at a constant temperature dependent on readings from the probe. The entire assembly is slidably mounted on the spaced parallel rails 27 along which it is horizontally movable by operation of the cylinder 28.

The ware support 11 is shown in Fig. 2 and in greater detail in Fig. 7. It comprises a carriage 50 incorporating a central mount 51 for articles of ware connected to a vacuum source operable to retain ware in position once centred by centring arms 52. The carriage 50 is mounted on a pair of spaced parallel rods 53 and is directly connected to a hydraulic cylinder 54 for movement along the rods 53 by introduction of hydraulic fluid to one or other end of the cylinder. Hydraulic dampers 55 are provided to arrest movement of the carriage 50 at each end of its travel which takes place in a radial direction relative to the vertical axis of the printing member 10 and at an angular location between adjacent ones of the transfer members 12. In its inner or printing position the ware support 11 is disposed in vertical alignment with the printing member 10. In its outer or loading position the ware support 11 is readily accessible to an operator or to automatic loading and unloading apparatus.

Figs. 8A to 8D diagramatically illustrate the printing operation. In Fig. 8A the printing member 10 is shown in its raised position and one of the transfer members 12 has been located between the printing member and an article 60 to be decorated supported on the ware support 11. The printing member 10 is then moved vertically downwards as shown in Fig. 8B into contact with the plate 26 from which it picks up the printing ink retained in the engraved portions of the plate. The printing member 10 is then raised clear of the transfer member 12 which is withdrawn to its retracted position leaving the printing member disposed vertically above the article 60 as shown in Fig. 8C. The printing member 10 is then moved vertically downwards into contact with the surface of the article 60 to transfer the printed image thereto. Thereafter the printing member 10 is withdrawn to its uppermost position and the next transfer member 12 is moved into the position shown in Fig. 8A, following which the sequence is repeated. In the embodiment four cycles are carried out to effect complete printing but this could of course vary depending on the number of colours concerned.

Operation of the doctor mechanism 30 is synchronized with the printing operations in order that when one colour image is being printed onto the article 60 of ware the next engraved plate 26 is being doctored. Thus in operation with all four engraved plates 26 in their retracted positions and the printing member 10 elevated, three of the plates 26 will be in an inked but not doctored condition, the first plate to come into operation will be inked and doctored and the ware support 11 will be in its retracted position accessible to an operator. The operator places an article 60 on the ware support 11, following which the centring arms 52 act to centre the article 60 and suction is applied to retain it in position. The cylinder 54 is then energised to move the ware support 11 to its extended position in which it is disposed vertically beneath the printing member 10.

The first engraved plate 26 which has been previously doctored is then moved to its extended position beneath the printing member 10 by operation of its cylinder 28. The printing member 10 is then moved downwardly into contact with the engraved plate 26 to pick up the inked image and is raised again to its uppermost position. Plate 26 is then withdrawn to its retracted position and the printing member 10 is moved vertically downwards into contact with the surface of the article 60 to be decorated thereby transferring the first coloured image to the article. Simultaneously the doctor mechanism 30 on transfer member 12B is actuated to doctor the associated engraved plate 26 leaving the printing ink in the engraved image only. Once the printing member 10 reaches its uppermost position the second engraved plate 26 carried by transfer member 12B is moved to its extended position beneath the printing member 10 and the latter is moved downwardly to pick up the inked image from the plate 26. Following withdrawal of the engraved plate 26 the printing member 10 is moved vertically downwards to transfer the second image to the surface of the article 60 on the ware support 11. During this operation the third engraved plate 26 is doctored and the sequence continues until all four colour images have been transferred to the article 60 of ware. The ware support 11 is then moved to its retracted position and the operator removes the decorated article and replaces it with a further article following which the operation is repeated.

By virtue of the arrangement described multicolour decorating of articles may be carried out extremely rapidly and accurately. Because the printing member 10 and the article 60 to be decorated remain horizontally fixed relative to one another throughout the decorating operation

registration problems are substantially eliminated. Moreover by arrangement of the transfer members 12A to 12D for the different components of the pattern in radial positions around the central printing member 10 and by providing separate doctor mechanisms 30 for each unit, one image can be doctored while the other is printing thereby enabling particularly rapid operation. Moreover only a single printing member is employed regardless of the number of colours to be applied.

Various modifications may be made without departing from the invention. For example the transfer member need not be an engraved or etched plate but could be a substrate to which the design or pattern is applied by screen printing. Means could be incorporated for temperature control of the printing member and/or ware support in addition to the transfer member if required. Alternative forms of doctor assembly may also be employed and while in the embodiment the machine is designed to apply four colours, any desired number of colours may be applied by increasing the number of transfer members arranged radially around the printing member. Moreover while reference has been made primarily to the printing of articles of ceramic ware the invention may be applied to the printing of a wide variety of other articles.

Claims

1. Multi-colour printing apparatus comprising a vertically movable non-rotatable printing member (10) a support (11) for ware (60) to be decorated locatable in a position beneath the printing member (10) and a plurality of transfer members (12) which are sequentially movable into positions between said printing member (10) and said ware support, characterized in that the transfer members (12) are disposed angularly around the central vertical axis of said printing member (10) at a level between same and said ware support (11), whereby to permit transfer of printed images therefrom to said printing member (10) for subsequent application to ware (60) mounted on said support.

2. Multi-colour printing apparatus according to claim 1 characterized in that said transfer members (12) comprise generally flat plates (26) on which is etched or engraved a portion of the pattern or decoration to be applied to the articles (60) of ware, each transfer member (12) being provided with doctor means (36) and control means being provided to effect doctoring of each plate (26) during transfer to the ware of the image from the preceding plate.

3. Multi-colour printing apparatus according to claim 2 characterized in that said doctor means (36) is operable following transfer of an image from the associated plate (26) to re-ink the plate (26) in readiness for the next operating cycle.

4. Multi-colour printing apparatus according to claim 3 characterized in that said doctor means incorporates a doctor blade (36) mounted for pivotal movement between inking and doctoring positions and adapted for bodily movement relative to the associated plate (26) in both operative positions of the latter.

5. Multi-colour printing apparatus according to any preceding claim characterized in that each of said transfer members (26) incorporates controllable heating means (44) operable to maintain the transfer member (12) at a temperature which will ensure complete transfer of heat sensitive inks from the transfer member (12) to said printing member (10) during operation.

6. Multi-colour printing apparatus according to any preceding claim characterized in that said ware support (11) is mounted on a carriage (50) arranged to be horizontally movable between a decorating position disposed vertically beneath said printing member (10) and a loading and unloading position convenient to a machine operator.

7. Multi-colour printing apparatus according to claim 6 characterized in that said ware support (11) is slidably movable in a direction radially of said printing member (10) in an angular direction intermediate the angular positions of adjacent ones of said transfer members (12).

8. Multi-colour printing apparatus according to any preceding claim characterized in that said ware support (11) incorporates means (52) for centring ware mounted thereon and for securing the centred ware against movement during operation.

9. Multi-colour printing apparatus according to any preceding claim characterized in that said printing member comprises a pad (10) of deformable material.

10. A method of multi-colour printing of articles by sequentially applying to the article (60) a plurality of images in different colours to make up the final pattern or decoration characterised by maintaining the article in a fixed stationary position while applying the different colours, each image for printing being introduced from a different angular position to a centrally disposed, vertically movable and non-rotatable printing member (10).

11. A method of multi-colour printing according to claim 10 characterized in that each successive coloured image is being prepared during printing of the preceding image.

Patentansprüche

1. Mehrfarbendruckvorrichtung mit einem senkrecht bewegbaren, nicht drehbaren Druckglied (10), einer in eine Stellung unterhalb des Druckgliedes (10) bringbaren Unterlage (11) für zu dekorierende Ware (60) und mehreren Übertragungsgliedern (12), die nacheinander in Stellungen zwischen dem Druckglied (10) und der genannten Warenunterlage bewegbar sind, dadurch gekennzeichnet, daß die Übertragungsglieder (12) in Winkelabständen um die zentrale senkrechte Achse des genannten Druckgliedes (10) in einer Höhe zwischen diesem und der

genannten Warenunterlage (11) angeordnet sind, wodurch gedruckte Bilder von den Übertragungsgliedern auf das genannte Druckglied (10) übertragbar sind, um anschließend auf die Ware (60) aufgebracht zu werden, die auf der genannten Unterlage angeordnet ist.

2. Mehrfarbendruckvorrichtung nach Anspruch 1, dadurch gekennzeichnet, daß die genannten Übertragungsglieder (12) im wesentlichen flache Platten (26) aufweisen, in die ein Teil des auf die Artikel (60) der Ware aufzutragenden Musters oder Dekors eingeätzt oder eingraviert ist, wobei jedem Übertragungsglied (12) eine Rakelvorrichtung (36) zugeordnet ist und Steuervorrichtungen vorgesehen sind, um das Rakeln jeder Platte (12) während der Übertragung des Bildes von der vorangehenden Platte auf die Ware zu bewirken.

3. Mehrfarbendruckvorrichtung nach Anspruch 2, dadurch gekennzeichnet, daß die Rakelvorrichtung (36) im Anschluß an die Übertragung eines Bildes von der zugehörigen Platte (26) betätigbar ist, um die Platte (26) zur Vorbereitung des nächsten Arbeitszyklus wieder einzufärben.

4. Mehrfarbendruckvorrichtung nach Anspruch 3, dadurch gekennzeichnet, daß die Rakelvorrichtung eine Rakel (36) aufweist, die zwischen Färbe- und Rakelstellungen hin- und herschwenkbar angeordnet und zu Eigenbewegungen in bezug auf die zugehörige Platte (26) in deren beiden Betriebsstellungen befähigt ist.

5. Mehrfarbendruckvorrichtung nach einem beliebigen vorangehenden Anspruch, dadurch gekennzeichnet, daß jedes der genannten Übertragungsglieder (12) eine regelbare Heizvorrichtung (44) aufweist, mit der sich das Übertragungsglied (12) auf einer Temperatur halten läßt, welche eine vollständige Übertragung wärmeempfindlicher Farben vom Übertragungsglied (12) auf das genannte Druckglied (10) im Betrieb gewährleistet.

6. Mehrfarbendruckvorrichtung nach einem beliebigen vorangehenden Anspruch, dadurch gekennzeichnet, daß die Warenunterlage (11) auf einem Schlitten (50) befestigt ist, der waagerecht zwischen einer senkrecht unter dem genannten Druckglied (10) angeordneten Dekorierstellung und einer für einen Maschinenbenutzer angenehmen Lade- und Entladestellung bewegbar ist.

7. Mehrfarbendruckvorrichtung nach Anspruch 6, dadurch gekennzeichnet, daß die genannte Warenunterlage (11) in einer bezüglich des genannten Druckgliedes (10) radialen Richtung in einem Winkel zwischen den Winkelstellungen benachbarter Übertragungsglieder (12) verschiebbar ist.

8. Mehrfarbendruckvorrichtung nach einem beliebigen vorangehenden Anspruch, dadurch gekennzeichnet, daß die Warenunterlage (11) eine Vorrichtung (52) zum Zentrieren der auf ihr angeordneten Ware und zum Sichern der Ware gegen Bewegungen während des Betriebes aufweist.

9. Mehrfarbendruckvorrichtung nach einem beliebigen vorangehenden Anspruch, dadurch gekennzeichnet, daß das Druckglied ein Kissen (10) aus verformbaren Werkstoff aufweist.

10. Verfahren zum mehrfarbigen Bedrucken von Artikeln durch aufeinanderfolgendes Aufbringen mehrerer Bilder in verschiedenen Farben auf den Artikel (60), aus denen sich das endgültige Muster oder Dekor ergibt, dadurch gekennzeichnet, daß der Artikel in einer festgelegten Ruhestellung gehalten wird, während die verschiedenen Farben auf ihn aufgebracht werden, wobei jedes Druckbild aus einer unterschiedlichen Winkelstellung auf ein zentral angeordnetes, senkrecht bewegbares und nichtdrehbares Druckglied (10) übertragen wird.

11. Mehrfarbendruckverfahren nach Anspruch 10, dadurch gekennzeichnet, daß jedes der aufeinanderfolgenden Farbbilder während des Aufdruckens des vorangehenden Bildes vorbereitet wird.

Revendications

1. Machine pour l'impression polychrome, comprenant un élément imprimant (10) non rotatif, mobile dans la direction verticale, un support (11) pour l'article à décorer (60), qui peut être placé dans une position située sous l'élément imprimant (10), et une pluralité d'éléments de transfert (12) qui peuvent être séquentiellement amenés dans des positions situées entre ledit élément imprimant (10) et ledit support d'article, caractérisée en ce que les éléments de transfert (12) sont disposés angulairement autour de l'axe vertical central dudit élément imprimant (10), à un niveau situé entre cet élément et ledit support d'article (11) pour permettre de cette façon le transfert des images imprimées de ces éléments de transfert audit élément imprimant (10) pour qu'elles soient ensuite appliquées à l'article (60) monté sur ledit support.

2. Machine pour l'impression polychrome selon la revendication 1, caractérisée en ce que lesdits éléments de transfert (12) comprennent des plaques (26) de forme générale plate, sur lesquelles est gravée ou creusée une portion du motif ou de la décoration qu'il s'agit d'appliquer sur les articles (60), chaque élément de transfert (12) étant muni de moyens racleurs (36), et des moyens de commande étant prévus pour effectuer le raclage de chaque plaque (26) pendant que l'image est transférée de la plaque précédente à l'article.

3. Machine d'impression polychrome selon la revendication 2, caractérisée en ce que lesdits moyens racleurs (36) entrent en action après le transfert d'une image de la plaque (26) correspondante pour réencrer la plaque (26) en préparation du cycle de fonctionnement suivant.

4. Machine d'impression polychrome selon la revendication 3, caractérisée en ce que lesdits moyens racleurs comprennent une lame racleuse (36) montée pour décrire un mouvement de pivotement entre des positions d'encrage et de raclage et adaptée pour décrire un mouvement d'ensemble par rapport à la plaque (26) corres-

pondante dans les deux positions de travail de cette dernière.

5. Machine d'impression polychrome selon une quelconque des revendications précédentes, caractérisée en ce que chacun des éléments de transfert (26) comprend des moyens de chauffage réglables (44) qu'on peut mettre en action pour maintenir l'élément de transfert (12) à une température qui garantira le transfert total des encres sensibles à la chaleur de l'élément de transfert (12) audit élément imprimant (10) pendant le fonctionnement.

6. Machine d'impression polychrome selon une quelconque des revendications précédentes, caractérisée en ce que ledit support d'article (11) est monté sur un chariot (50) agencé pour pouvoir se déplacer horizontalement entre une position de décoration disposée à la verticale au-dessous dudit élément imprimant (10) et une position de chargement et de déchargement qui est commode pour l'opérateur de la machine.

7. Machine d'impression polychrome selon la revendication 6, caractérisée en ce que ledit support d'article (11) peut se déplacer en coulissement dans une direction radiale par rapport audit élément imprimant (10), dans une direction angulaire intermédiaire entre les positions angulaires des éléments de transfert (12) adjacents.

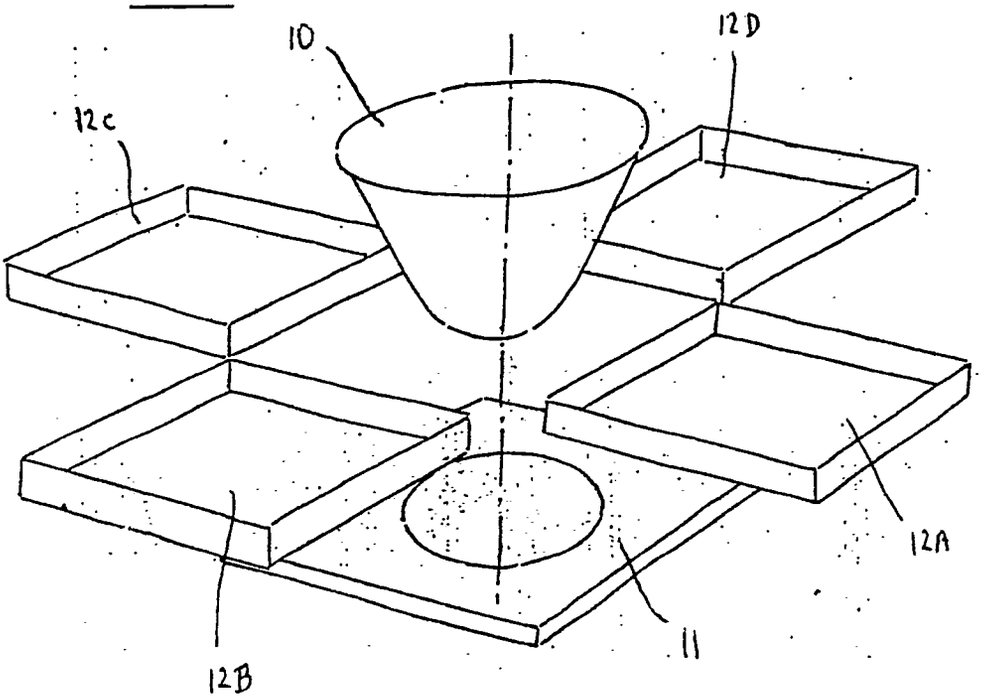
8. Machine d'impression polychrome selon une quelconque des revendications précédentes, caractérisée en ce que ledit support d'article (11) comprend des moyens (52) pour centrer l'article monté sur ces moyens et pour fixer l'article centré en l'empêchant de se déplacer pendant le fonctionnement.

9. Machine d'impression polychrome selon une quelconque des revendications précédentes, caractérisée en ce que ledit élément imprimant comprend un tampon (10) de matière déformable.

10. Procédé d'impression polychrome d'articles dans lequel on dépose successivement sur l'article (60) une pluralité d'images en différentes couleurs de façon à composer le motif final ou la décoration finale, caractérisé en ce qu'on maintient l'article dans une position stationnaire fixe pendant l'application des différentes couleurs, chaque image à imprimer étant introduite, en provenance d'une position angulaire différente, sur un élément imprimant disposé en position centrale, mobile dans la direction verticale et non rotatif.

11. Procédé d'impression polychrome selon la revendication 10, caractérisé en ce que chacune des images en couleurs successives est préparée pendant l'impression de l'image précédente.

FIG.1



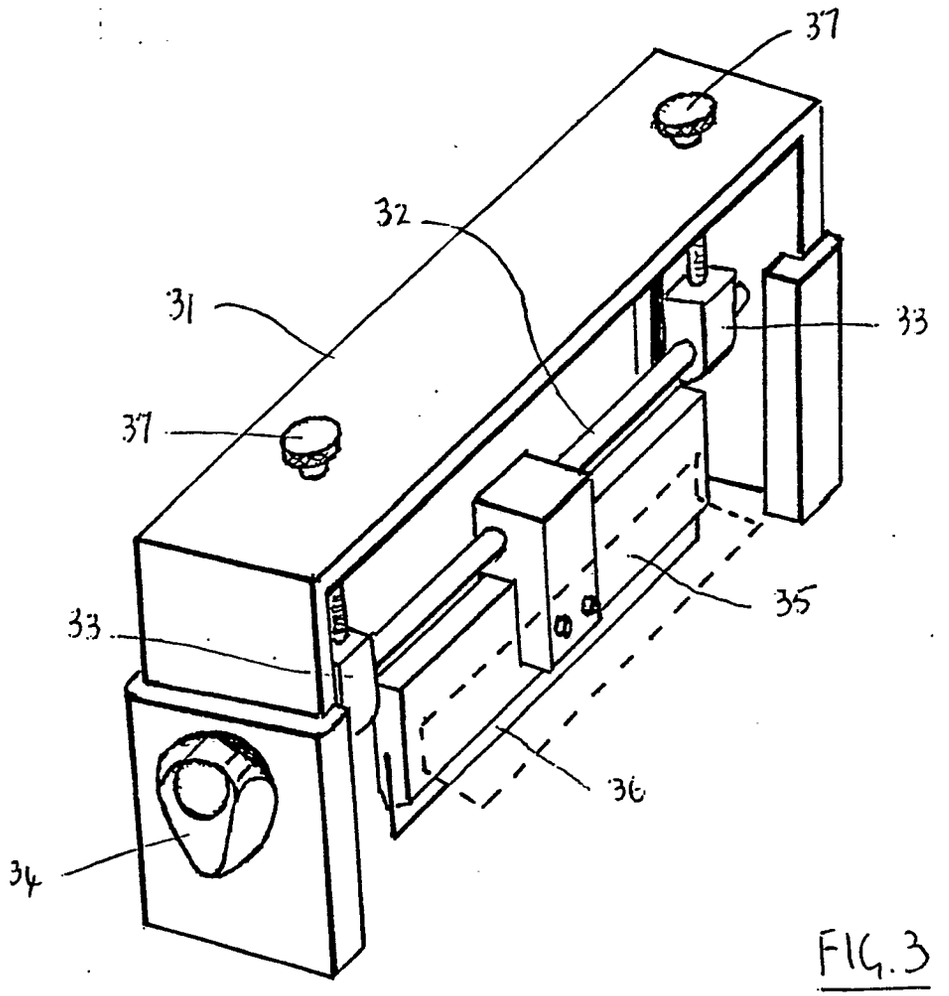
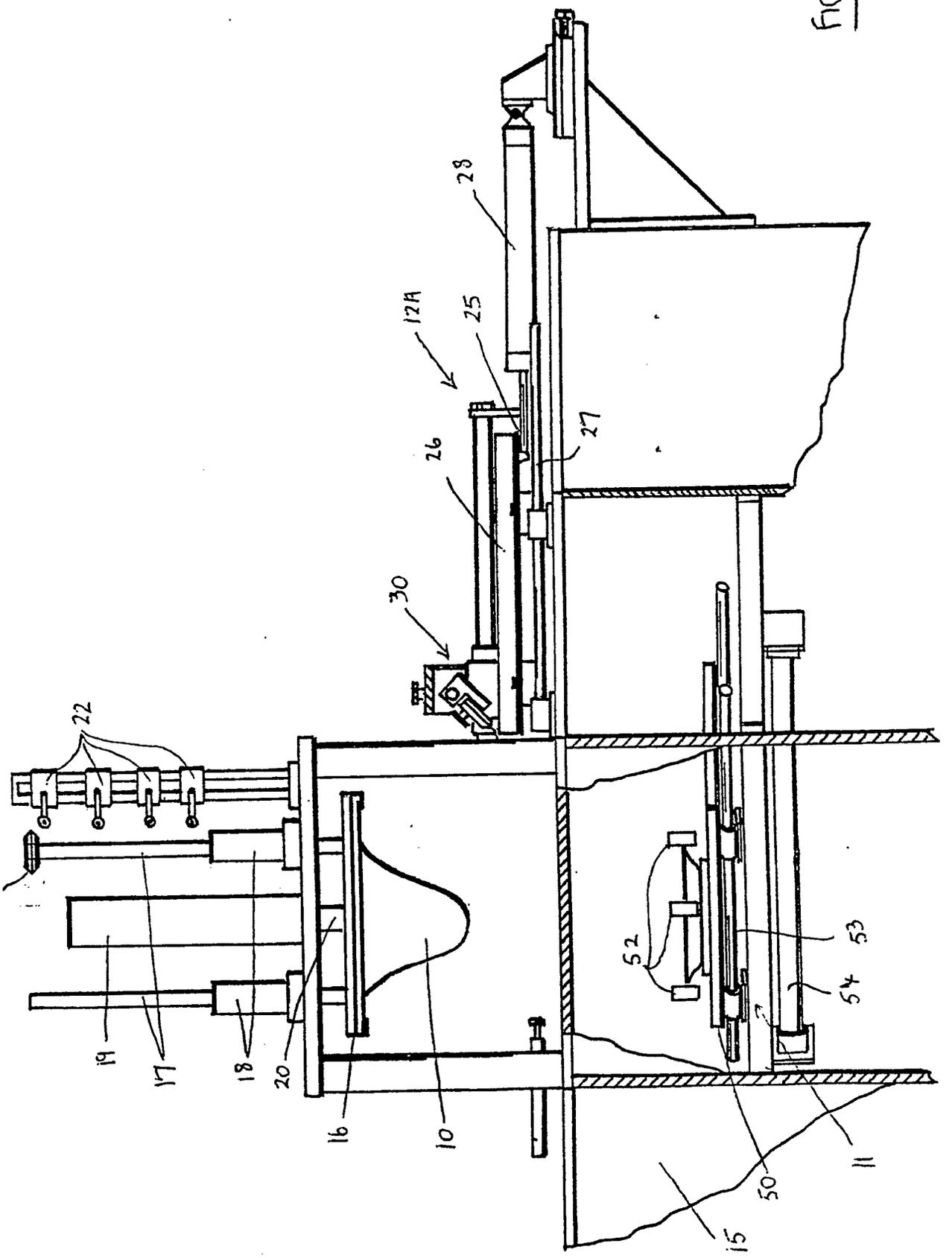


FIG.3

Fig.2



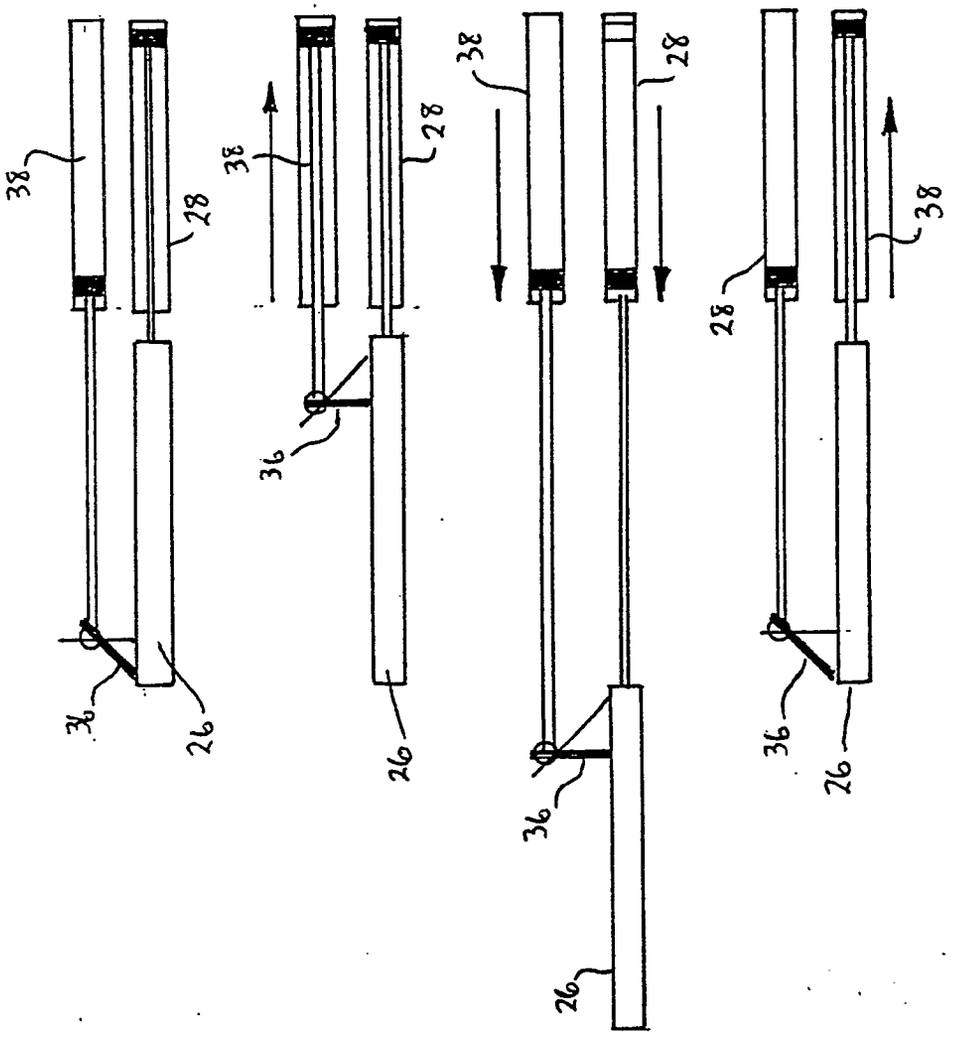


FIG 4A FIG. 4B FIG. 4C FIG. 4D

FIG. 5

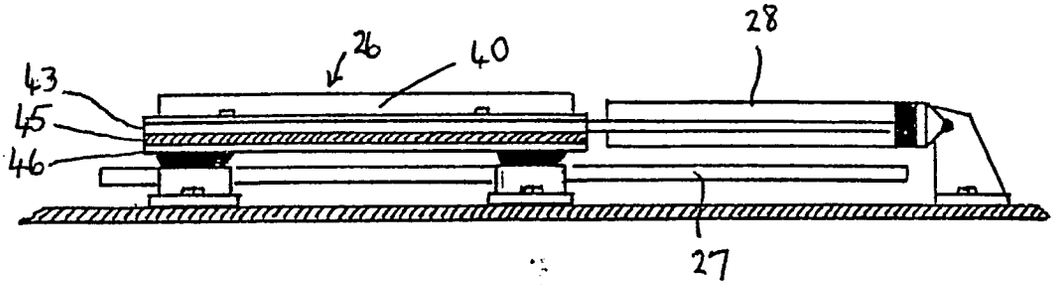
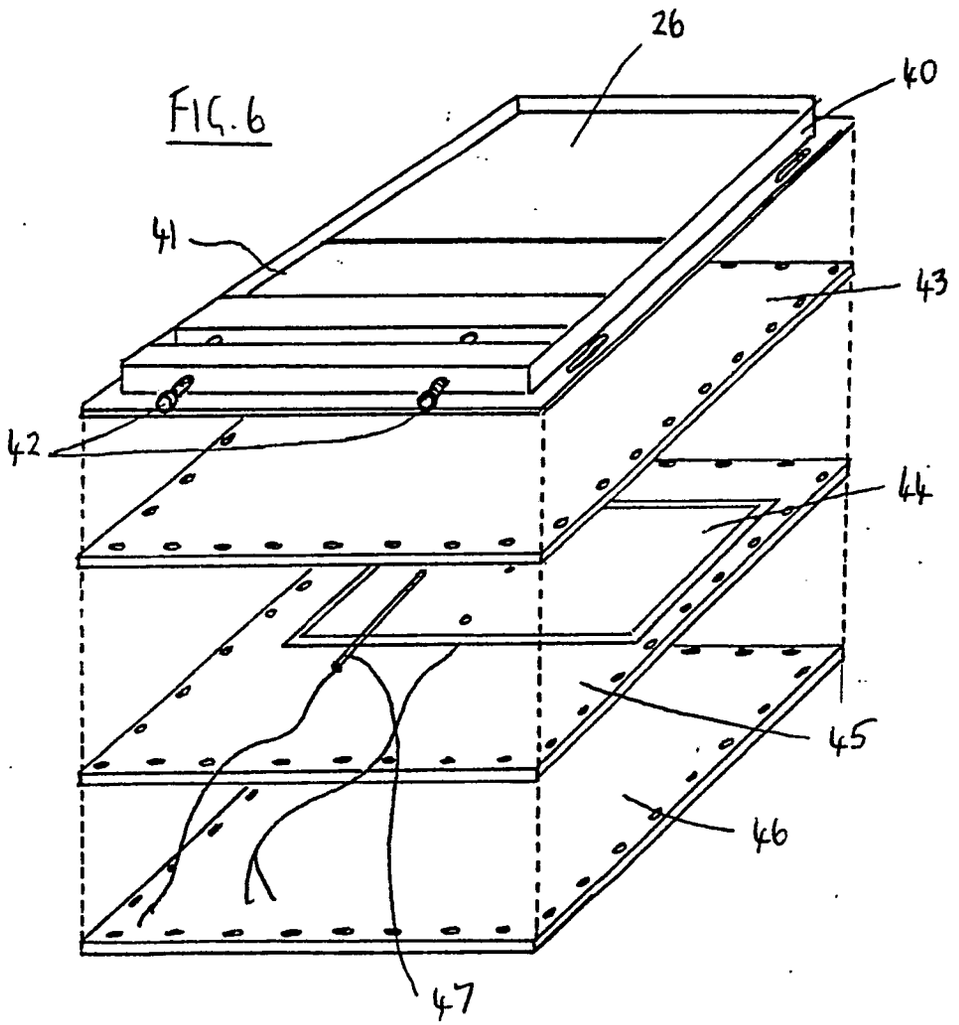


FIG. 6



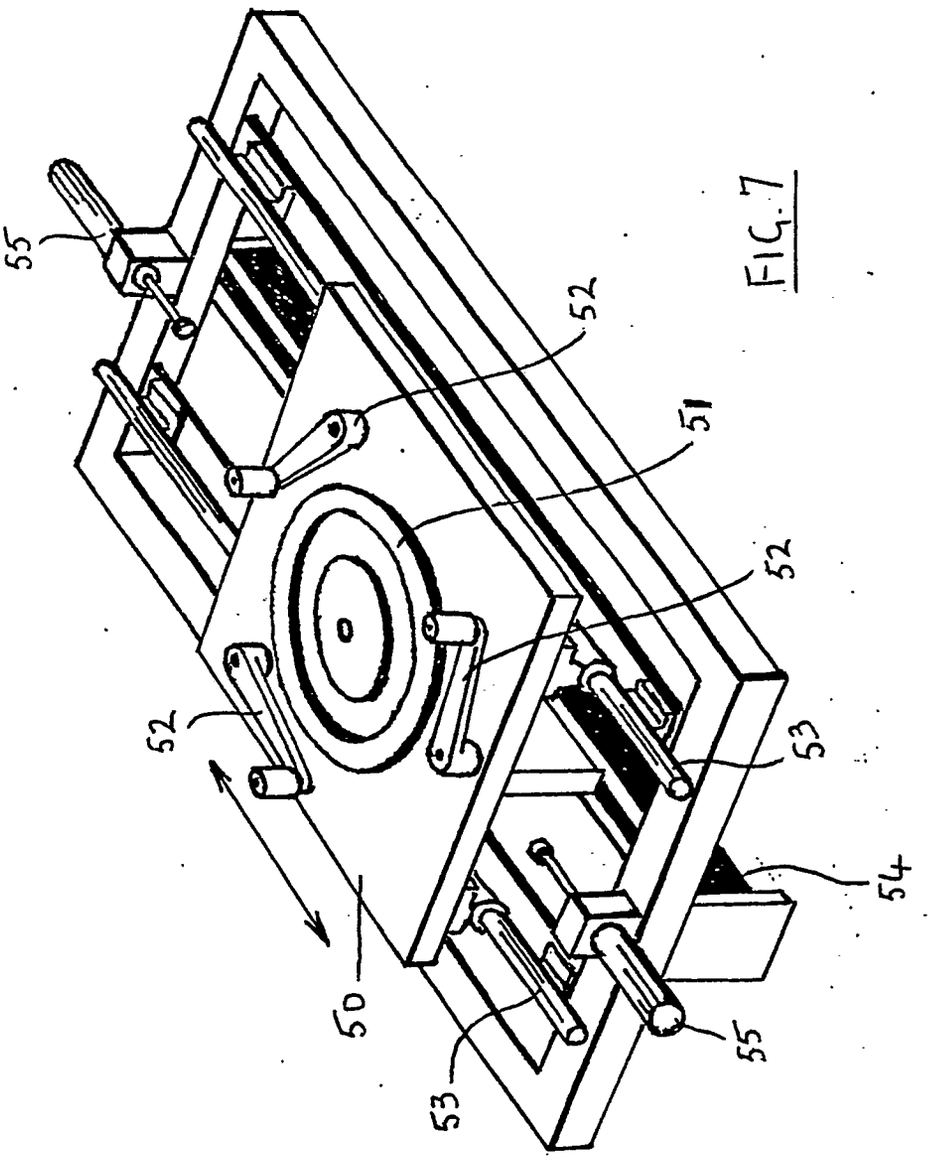


FIG. 7

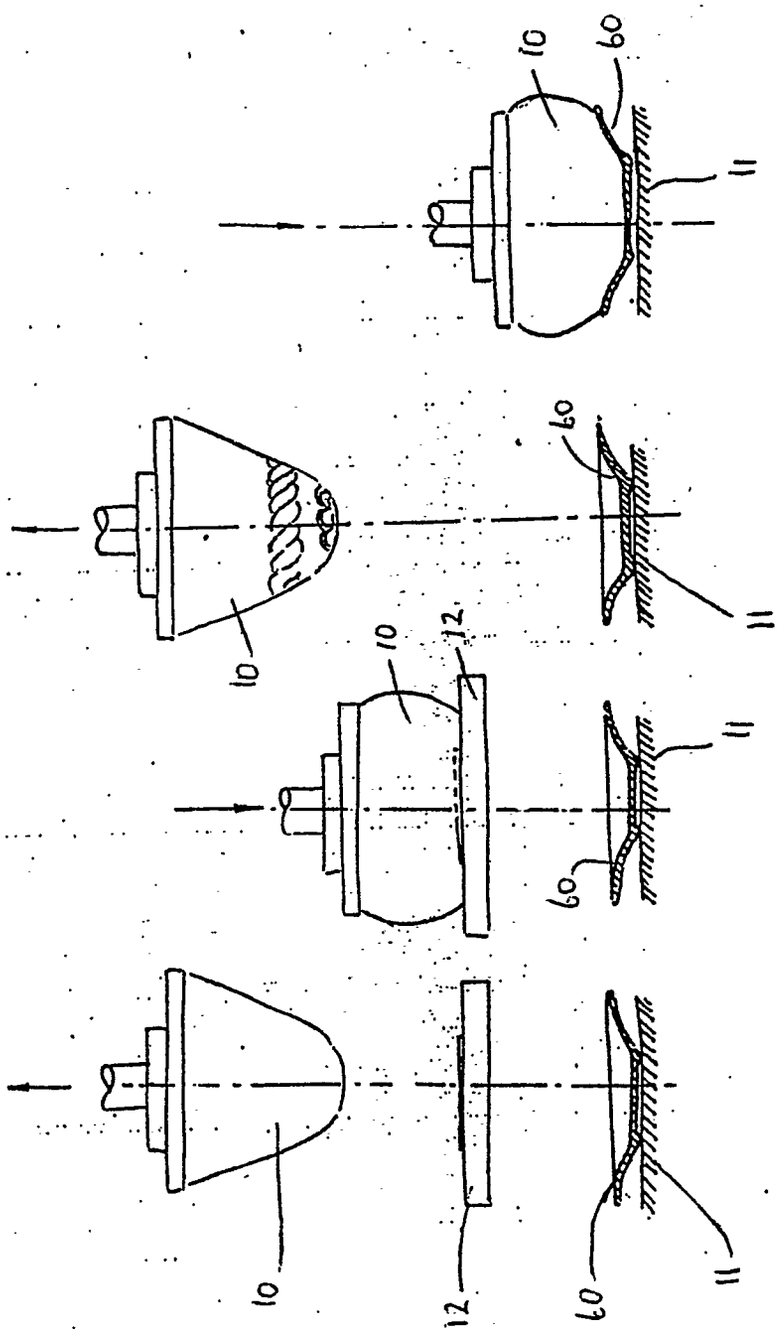


FIG. 8D

FIG. 8C

FIG. 8B

FIG. 8A