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(12) # EUROPEAN PATENT APPLICATION

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The title of the invention has been amended (Guidelines for Examination in the EPO, A-III, 7.3).

(54) **Inking rollers for multicolour printing.**

(57) The invention relates to colour printing apparatus in which printing ink is transferred from a reservoir (15) by means of at least one ink transfer roller (16), the ink transfer roller (16) incorporating two or more roller segments (45) which can be positioned axially on a mandrel (38) so that laterally spaced in flow paths can be provided between the reservoir (15) and a printing station.

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Description

Improvements in or relating to Colour Printing

This invention relates to a method and apparatus for the printing of discrete areas of colour on a printing medium, for example, a paper sheet.

The invention can be applied in any situation where the printing of discrete areas of different colours is required. The invention is particularly, but not exclusively, applicable to the colour printing of paint colour charts incorporating a plurality of spaced areas, usually rectangular, each of a different colour or shade and which can be used for the purpose of selecting a desired colour scheme. Such discrete areas on a paint colour chart are commonly referred to as "colour chips".

Such paint colour chips have previously been produced on charts by means which does not involve lithographic apparatus. Prior methods of production have tended to be slow and consequently relatively expensive.

An object of the present invention is to produce paint colour charts incorporating colour chips by lithographic means.

It will be appreciated that a common lithographic colour printing process involves the provision of a reservoir or duct which is adapted to contain coloured ink. It will be understood that the term "ink" as used hereinafter and in the claims is used to include any coloured pigment suitable for printing purposes. The ink is transmitted from the reservoir to an elongated cylindrical ink transfer roller or rollers which transfer ink of the colour contained in the reservoir to a printing station e.g. a plate having a predetermined image. The image is then transferred from the plate to a rubber-coated printing blanket, frequently in the form of a cylinder. Finally, the image is transferred from the rubber blanket roller to a paper sheet. If more than one colour is required on the finished image then more than one pass of the paper sheet is required. In this way multi-coloured images can be built up.

The colour printing of a paint chart is difficult to produce by means of a lithographic process as such a chart inevitably consists of a plurality of closely adjacent discrete areas of differing colour. Consequently, it is not possible to produce such a chart utilising the normal continuous rubber-covered inking roller as there will be a tendency for the different colours to merge into one another.

According to the present invention there is provided colour printing apparatus comprising a reservoir for printing or the like and at least one ink transfer roller for taking up ink from the reservoir for subsequent passage to a printing station at which the printing ink is applied to a medium in a predetermined pattern characterised in that said reservoir is adapted to contain a plurality of colours or shades of printing ink, and means is provided for making axial positional adjustment to a surface of said ink transfer roller whereby ink of a selected colour or shade can be taken up by said ink transfer roller.

Preferably, each segment is in the form of a metallic roller having an outer rubber covering thereon.

According to a further aspect of the invention, there is provided an ink transfer roller having an ink transfer surface for receiving ink from an ink supply, characterised in that said ink transfer surface is adapted to be positionally adjustable in an axial direction whereby ink from more than one source can be selectively transferred by said roller.

According to yet another aspect of the present invention there is provided a method of printing discrete areas of differing colour or shade on a printing medium comprising transferring printing ink or the like from an ink reservoir to a printing station through the intermediary of an ink transfer roller or rollers characterised in that the method comprises providing an ink reservoir with means for containing a plurality of colours or shades of printing ink; locating an ink transfer roller adjacent said reservoir with an axially positionable surface of said ink transfer roller in ink take-up relationship with said reservoir whereby ink of a selected colour or shade can be taken up by said ink transfer roller; applying ink from said surface to a first area of the medium to be printed; and subsequently repositioning said ink transfer surface of said roller at a different axial location and applying ink therefrom to a second area of said medium and spaced from said first area.

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

Fig. 1 is a diagrammatic representation of a known form of colour printing apparatus;

Fig. 2 is a fragmentary representation of a colour printing apparatus in accordance with the present invention;

Fig. 3 is a front view of an ink transfer roller mandrel for use in the apparatus of the present invention;

Fig. 4 is a front view of a roller segment adapted to be carried by the mandrel shown in Fig. 3; and

Fig. 5 is an end view of the segment of Fig. 4.

Referring to Fig. 1 of the drawings, there is shown a known form of colour printing apparatus comprising a main paper-receiving cylinder 10 which is mounted in operative relationship with a pair of rubber blanket cylinders 11. The blanket roller cylinders 11 are arranged to co-operate with plate printing cylinders 12. The plate cylinders 12 receive ink from ink reservoirs or ducts 13 through a plurality of ink treatment cylinders indicated generally by the reference numeral 14. Each batch of ink treatment rollers 14 is made up of a series of (a) ink transfer rollers, (b) oscillating rollers for contacting the ink on the ink transfer rollers and breaking down the pigment of ink carried thereby, and (c) rider or back-up rollers serving to space the various ink transfer rollers from each other. The ink transfer rollers, oscillating rollers and back-up rollers all have a continuous surface extending across the full width

of the machine.

Because such an arrangement consists of continuously surfaced rollers, it will be readily apparent that such continuous rollers cannot be effectively used to transfer a number of different colours from an ink reservoir to the plate cylinder without the various colour tending to spread across the surface of the rollers and merge with each other.

Accordingly, the present invention seeks to modify the above described arrangement to permit multi-coloured printing in a more effective and consistent manner. In order to do this, the arrangement is as shown in Fig. 2. Fig. 2 shows a colour printing apparatus comprising a multi-colour ink reservoir 15 from which ink can be drawn by a primary ink transfer roller 16 and transferred via further ink transfer rollers 17,18,19,20,21,22,23,24,25 and 26 to a plate cylinder 27. Oscillating rollers 28,29,30 and 31 are arranged parallel to and in operative relationship with ink transfer rollers 17 and 18; 21 and 22; 22,25 and 26; and 19,23 and 24 respectively. Each oscillating roller oscillates in a horizontal axial direction and each oscillating roller has a continuous surface extending over the width thereof formed by a covering of synthetic plastics material.

Back-up rollers 32,33 and 34 are fixed and are in operative contact with ink transfer rollers 19,20 and 21, 22, and 18 and 19 respectively. Each back-up roller also has a continuous surface extending across the full width of the machine and is covered with a synthetic plastics cover.

The primary ink transfer roller 16 is mounted in conventional transverse relationship relative to elongated ink reservoir 15 extending continuously across substantially the full width of the machine. The ink reservoir 15 is provided also in conventional manner with a scraper blade 37 which operates in co-operation with the surface of ink transfer roller 16 to control the amount of ink applied to the roller.

Referring particularly to Figs. 3 to 5 of the drawings, each ink transfer roller comprises a mandrel 38 having a pair of bosses 39,40 at each end for rotatably mounting the mandrel in the printing machine. At its central portion, the mandrel 38 is of enlarged diameter as at 41 and is provided with an axially extended slot or keyway 42. The mandrel 38 has intermediate stepped portions 43,44 of reducing diameter between the central portion 41 and the end bosses 39,40.

A plurality of roller segments can be mounted on the enlarged central portion 41 of the mandrel 38 as indicated in Fig. 2. Each roller segment 45 is as shown in Figs. 4 and 5 and comprises a rigid annular metallic cylinder or core 46 provided with an ink transfer surface on an outer steel roller or covering 47. The core 46 extends axially beyond the ends of the outer covering 47 and the core extensions are provided with tapped screw-threaded holes 49. The roller segments 45 can be slid over the enlarged centre portion 41 of the mandrel 38 and locked in position by means of grub screws (not shown) passing through the holes 49 and extending into the axial slot 42 in the central portion 41 of the mandrel 38. It will be readily apparent that the axial position of the roller segments 45 on the mandrel 38 can be varied as desired and any desired number of roller segments, e.g. four, can be positioned at spaced intervals along the mandrel.

Associated with the reservoir 15 is a separator or separators comprising a pair of parallel plates 50,51 extending transversely across the top of the reservoir and spaced from each other by a distance slightly greater than the length of a roller segment 45 as shown in Fig. 2 so that the plate 50,51 are positioned on either side of its associated roller segment 45. The plates 50,51 of each separator are mounted through a bracket 52 on slide 53 which is slidable transversely of the apparatus within a slideway 54 mounted on the rear face of reservoir 15. The slides 53 can be positioned along the length of the slideway 54 and releasably secured in any desired position.

The plats 50,51 of each separator extend downwardly to engage the inner surface of reservoir 15 so as to provide a separate ink-receiving compartment from which ink of a predetermined colour or shade can be supplied to an associated roller segment 45 on primary ink transfer roller 16. It will be understood that any desired number of separators can be positioned along the length of reservoir 15 in order to provide a plurality of separate compartments spaced and sealed from each other so that different colours or shades of ink can be transferred simultaneously to the correspondingly spaced roller segments on primary ink transfer roller 16.

Each of the ink transfer rollers 16 to 26 of the apparatus of Fig. 2 is fitted with roller segments 45 positioned on each roller at the same transverse location so that the segments of the various ink transfer rollers form an ink transfer path extending longitudinally of the apparatus to the plate cylinder 27.

In use of the apparatus in accordance with the invention the primary ink transfer roller 16 has mounted thereon a number of roller segments 45 corresponding to the number of colours which are to be applied in a single pass. The rollers 45 are then spaced along the length of the roller 16 so that their location corresponds to the location of appropriate colour compartments of the ink reservoir 15 as defined by reservoir separator plates 50,51 said separators being correspondingly positioned along the length of the reservoir on their slideway 54. The segments 45 are positioned on the other ink transfer rollers 17 to 26 to correspond with the position of those segments on the primary ink transfer roller 16. A selected colour of ink is supplied to each separator compartment and the apparatus is then operated in order to effect a first pass in which the selected colours are applied to the plate cylinder 27. When other colours require to be applied in a further pass, the segments on the primary ink transfer roller 16 and their associated separators are changed axially as to their positions. The positions of the segments 45 on the other ink transfer rollers are modified to correspond thereto. A further pass of the machine is then effected to apply these further colours to the plate cylinder 27 at locations spaced from the areas to which colours were applied in the

first pass.

The apparatus has been found to be particularly useful for the printing of rectangular areas or colour batches of a plurality of specified colours at a predetermined location on a sheet which will ultimately form a print colour chart. The paint colour chart will be made up of a range of different rectangular discreet batches each of differing colour or shade. If, for example, four spaced roller segments 45 are provided on the primary roller 16, four colours corresponding to the positions of those colour segments will be supplied to the plate cylinder 27 in a single pass and because of the spaced locations of the roller segments 45 there is no opportunity for any of the colours to merge one into the other. Once the first phase has been completed, the position of the segmented rollers 45 is altered so that they now correspond to the location of a further set of four colours contained in ink separators provided within the ink reservoir 15. This further set of colour batches is then applied as before to the plate cylinder 27. Further passes are then made as required according to the number of colour batches required on the finished paint colour chart.

In order to produce a paint colour chart containing around forty different colours or shades, it may be necessary to utilise around eighteen different plates involving eight separate passes of a printed sheet through the apparatus.

By the provision of a segmented roller as described above for the ink transfer rollers, lithographic apparatus can be employed for the colour printing of paint charts. This enables the printing of such charts to be effected more speedily and more cost effectively as compared with those previously produced by prior machines.

It will be appreciated that modifications can be made to the embodiments described above without departing from the scope of the invention. For example, although an arrangement has been described in which the reservoir 15 is provided with separate sealed ink-receiving compartments defined by plates 50,51 and which compartments are slidable relative to the reservoir, other alternative forms of separate compartments can be provided. Such an alternative form could involve the provision of a series of interchangeable reservoirs 15 each having preformed integral walls sub-dividing the reservoir into separate compartments along its length. The reservoirs of the series would have compartments formed at different lengthwise locations of the reservoir so that one reservoir could be exchanged for another to enable ink therefrom to be supplied to different axially spaced locations on the printing plate.

Claims

1. Colour printing apparatus comprising a reservoir (15) for printing ink or the like and at least one ink transfer roller (16) for taking up ink from the reservoir for subsequent passage to a printing station at which the printing ink is applied to a medium in a predetermined pattern characterised in that said reservoir (15) is adapted to contain a plurality of colours or shades of printing ink, and means is provided for making axial positional adjustment to a surface(47)of said ink transfer roller (16) whereby ink of a selected colour or shade can be taken up by said ink transfer roller (16).

2. Apparatus as claimed in claim 1, in which the means for making positional adjustment to the ink transfer roller comprises at least one roller segment (45) movable axially on the roller (16), and securing means (42,49) being provided for releasably locating the segment in a given axial position on the roller (16).

3. Apparatus as claimed in claim 2, in which the ink transfer roller (16) comprises two or more roller segments (45) spaced axially from each other.

4. Apparatus as claimed in claim 2 or 3, in which each segment (45) is axially slidable on a central mandrel (38).

5. Apparatus as claimed in any of claims 2 to 4, in which the means for releasably securing each segment (45) comprises a screw extendable through the segment to engage an exially extending slot (42) on the surface of mandrel (38)

6. Apparatus as claimed in any of claims 2 to 5, in which each segment (45) is in the form of a rigid core (46) surrounded by a roller covering (47).

7. Apparatus as claimed in claim 6, in which the covering is of steel.

8. Apparatus as claimed in any of claims 2 to 7, in which one or more separator means (50,51) is provided on the reservoir (15), each separator means defining within the reservoir (15) a separate, sealed ink-receiving compartment.

9. Apparatus as claimed in claim 8, in which each separator means comprises a pair of spaced parallel plates (50,51) adapted to extend across the reservoir (15) and to extend into sealing engagement with the internal surface of said reservoir.

10. Apparatus as claimed in claim 8 or 9, in which each separator means is slidable lengthwise of the reservoir (15).

11. Apparatus as claimed in any of claims 3 to 10, in which the ink is transferred from each of the roller segments (45) on roller (16) to the printing station through a series of additional contacting ink transfer rollers (17 - 26), each having roller segments (45) at substantially the same axial spacing as those on ink transfer roller (16).

12. An ink transfer roller (16) having an ink transfer surface (47) for receiving ink from an ink supply, characterised in that said ink transfer surface (47) is adapted to be positionally adjustable in an axial direction whereby ink from more than one source can be selectively transferred by said roller.

13. A roller as claimed in claim 12, in which the ink transfer roller (16-26) comprises at least one roller segment (45) movable axially of the roller, and securing means (42,49) being provided for releasably locating the segment in a given axial position on the roller.

14. A roller as claimed in claim 13, in which the ink transfer roller (16-26) comprises two or more segments (45) spaced axially from each other.

15. A roller as claimed in claim 13 or 14, in which each segment (45) is axially slidable on a central mandrel (38).

16. A roller as claimed in any of claims 13 to 5, in which the means for releasably securing each segment (45) comprises a screw extendable through the segment to engage an axially extending slot (42) on the surface of the mandrel (38).

17. A roller as claimed in any of claims 13 to 16, in which each segment (45) is in the form of a rigid annular core (46) surrounded by a roller covering (47).

18. A roller as claimed in claim 17, in which the covering (47) is of steel.

19. A method of printing discrete areas of differing colour or shade on a printing medium comprising transferring printing ink or the like from an ink reservoir to a printing station through the intermediary of an ink transfer roller or rollers characterised in that the method comprises providing an ink reservoir (15) with means for containing a plurality of colours or shades of printing ink; locating an ink transfer roller (16) adjacent said reservoir (15) with an axially positionable surface (47) of said ink transfer roller in ink take-up relationship with said reservoir whereby ink of a selected colour or shade can be taken up by said ink transfer roller; applying ink from said surface to a first area of the medium to be printed; and subsequently repositioning said ink transfer surface of said roller (16) at a different axial location and applying ink therefrom to a second area of said medium and spaced from said first area.

20. A method as claimed in claim 19, comprising providing each ink transfer surface (47) on at least one axailly adjustable roller segment (45).

21. A method as claimed in claim 20, comprising providing a plurality of axially adjustable roller segments (45) on said roller (16).

22. A method as claimed in any of claims 19 to 21, comprising defining a plurality of separate, sealed ink-receiving compartments along the reservoir (15).

23. A method as claimed in claim 22, in which said compartments are pcsitionally adjustable along the reservoir (15).

24. A printed medium when produced by the method as claimed in any of claims 19 to 22.

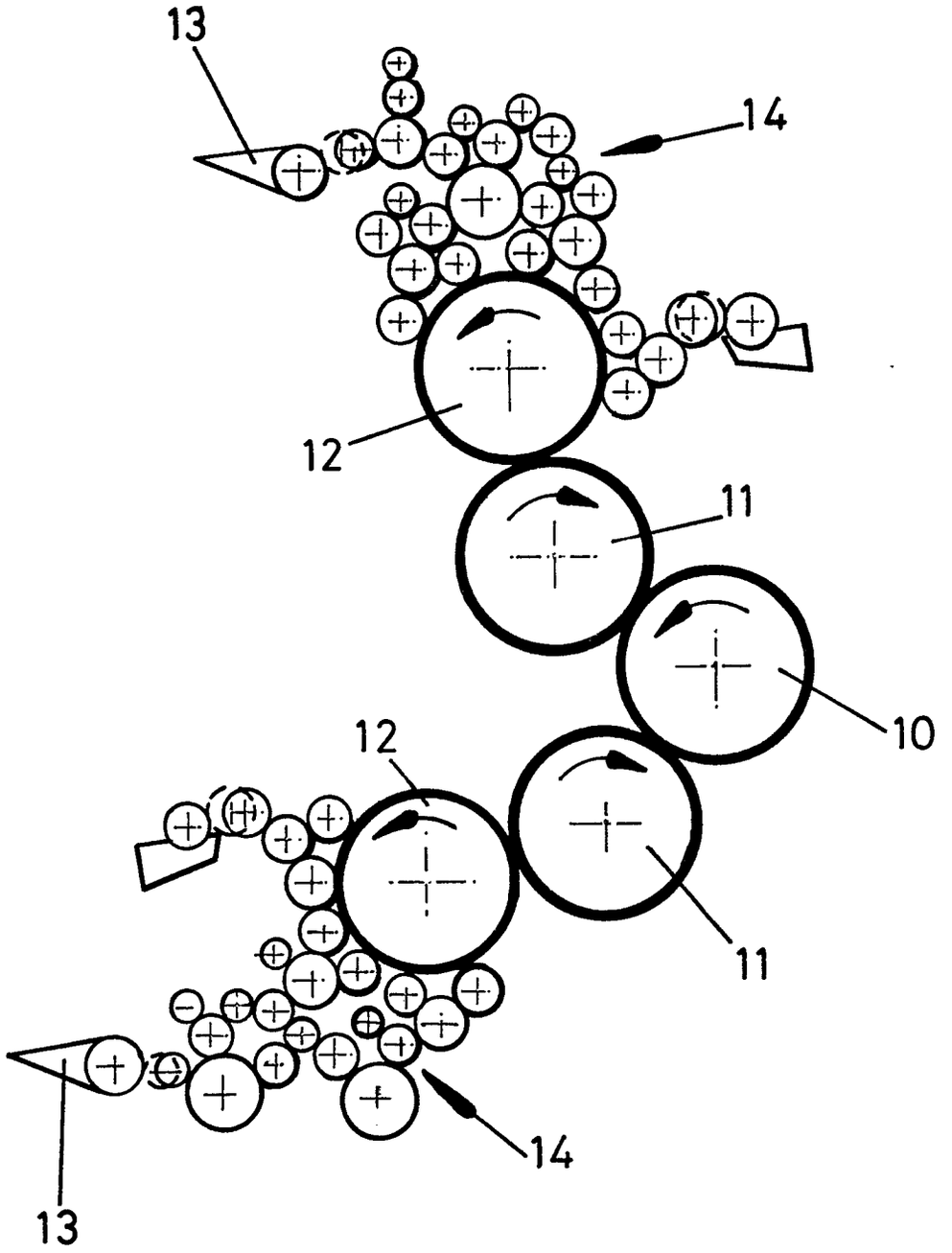

FIG. 1

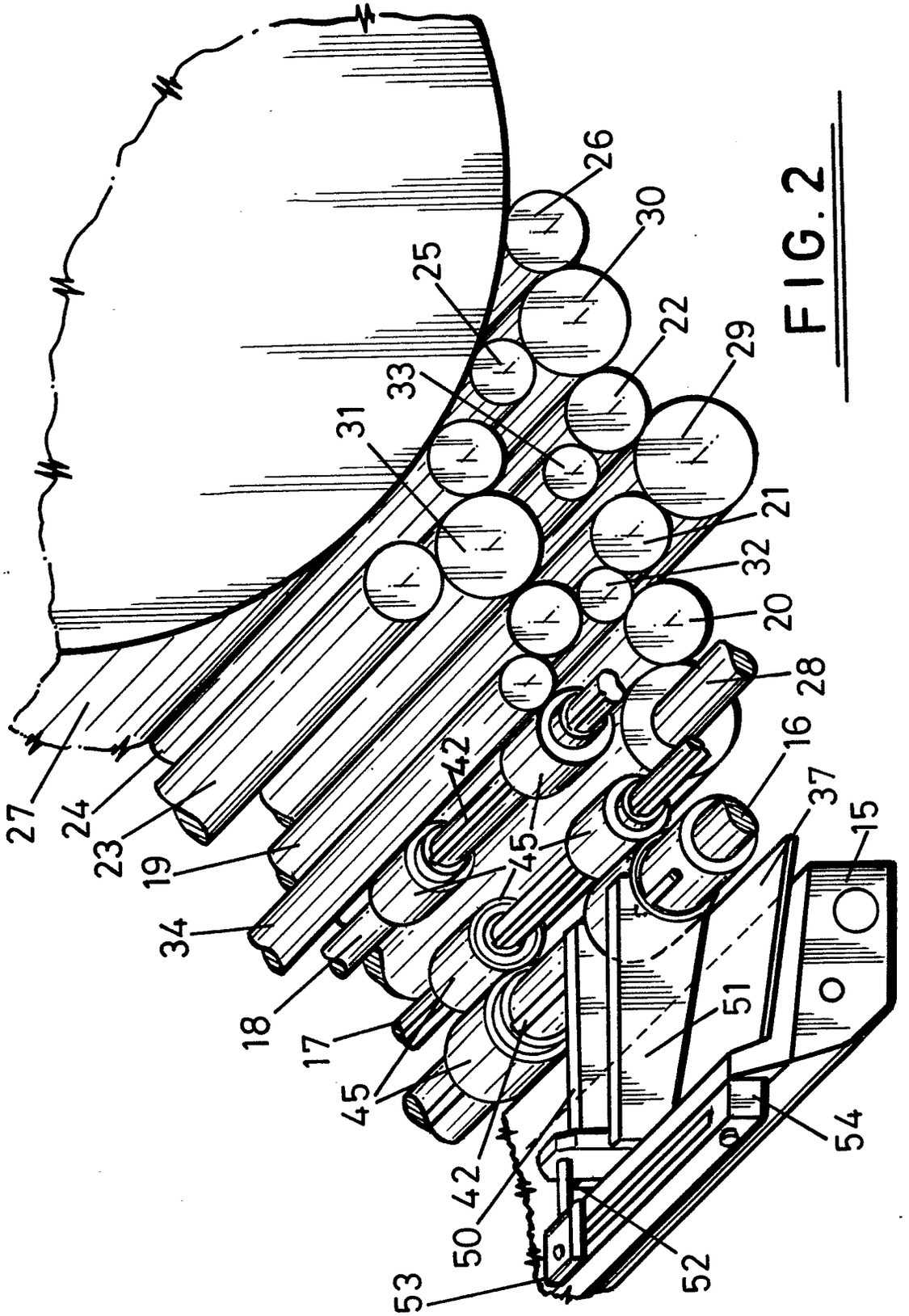
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FIG. 2

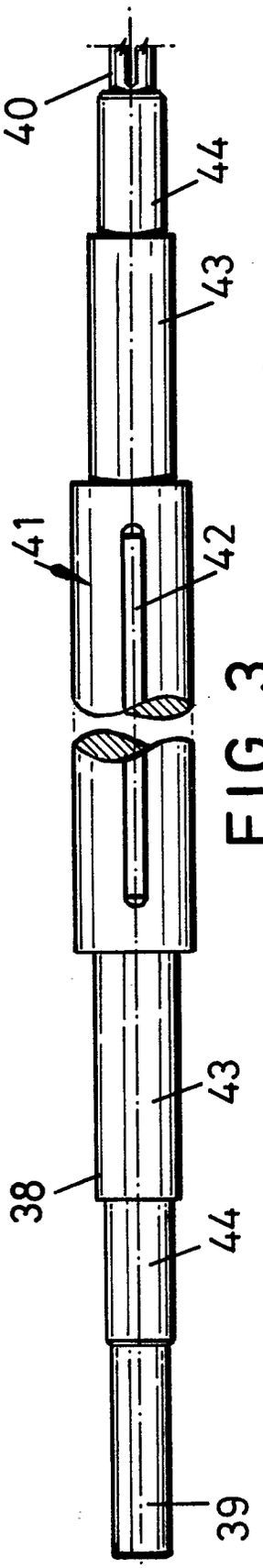

FIG.3

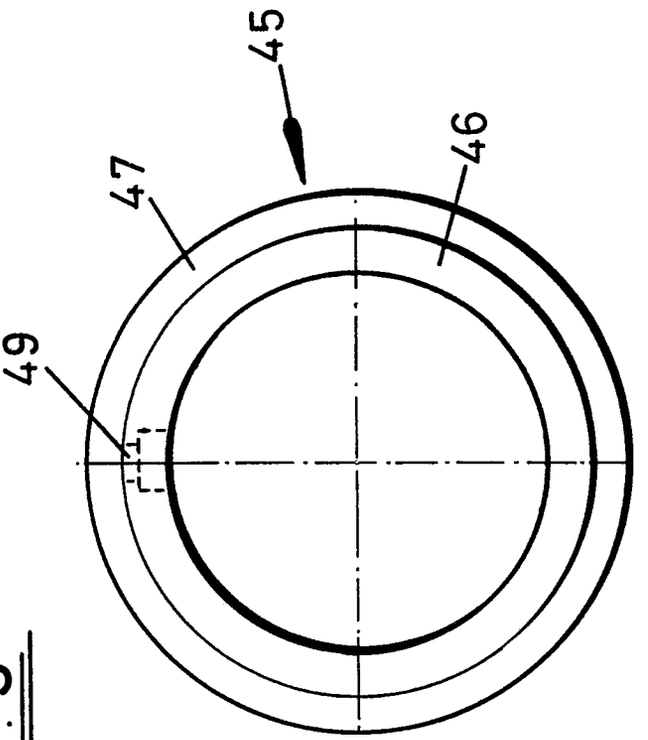

FIG.5

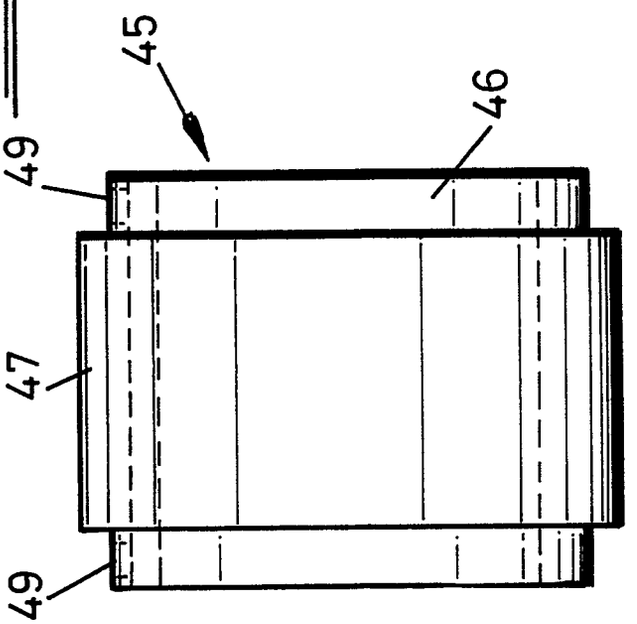

FIG.4