

(19)



Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number:

**0 259 994
A2**

(12)

EUROPEAN PATENT APPLICATION

(21) Application number: **87307344.9**(51) Int. Cl.4: **B41J 1/28 , B41J 3/38**(22) Date of filing: **19.08.87**

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

(30) Priority: **20.08.86 GB 8620230**
03.10.86 GB 8623852
03.10.86 GB 8623853
03.10.86 GB 8623854
04.10.86 GB 8623879
04.10.86 GB 8623880
04.10.86 GB 8623881

(43) Date of publication of application:
16.03.88 Bulletin 88/11

(84) Designated Contracting States:
AT BE CH DE ES FR GB GR IT LI LU NL SE

(71) Applicant: **Dunhill & McGrouther Limited**
115 Rimsdale Street
Bridgeton Glasgow G40(GB)

(72) Inventor: **McGrouther, David Alexander**
20A Gartconnell Road
Bearsden Glasgow G61 3BW(GB)

(74) Representative: **Murgitroyd, Ian G. et al**
Murgitroyd and Company Mitchell House 333
Bath Street
Glasgow G2 4ER(GB)

(54) **Type disc for a printing device.**

(57) A known form of printing machine for printing alphanumeric characters and symbols on an elongate tape utilises a circular font or "typedisc". The known typedisc is a one-piece moulding which makes even a minor alteration in the character set expensive to achieve. In order to maximise the use of common components while avoiding the difficulties associated with individually replaceable characters, selected sub-sets of characters, symbols or patterns are mounted or formed on the periphery of a part-circular segment 3. A suitable number of segments 3 are detachably secured to a common hub 2 by mounting means (5-9, 16a, 16b). The sub-sets of characters can be formed separately and attached to a common segment component (Figs 8-10), or formed directly on otherwise identical basic segments (Figs 11-15). Segments are readily interchangeable, and a multiplicity of typediscs can be formed from a minimum number of components (2, 3, 5) which differ only in the readily formed and individualised characters (41;42) that they carry.

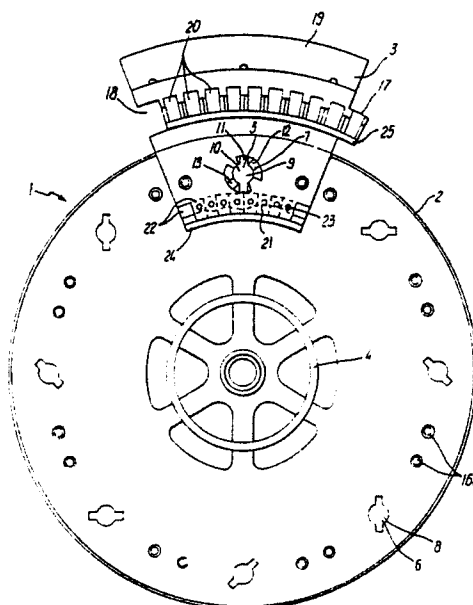


FIG. 1

EP 0 259 994 A2

"Printing Devices"

This invention relates to printing devices.

BACKGROUND OF THE INVENTION

It is known from United Kingdom Patent specifications 1419044 and 1431745 to utilise a printing apparatus for imprinting letters onto an elongated tape. Further details of such apparatus are given in United States Patents 3834507, 3912064, 4243333, and 4462708. The letters and the characters are carried on a unitary circular font as shown in Figures 12 and 13 of each of the above-mentioned United Kingdom Patent specifications 1419044 and 1431745. Such a circular font will be hereinafter referred to as a "typedisc". In the printing apparatus referred to above, the typedisc is removable and replaceable as a whole (being a one-piece moulding). Thus, if it is desired to utilise a letter or character not on a given typedisc, the entire typedisc must be replaced with another which has the desired letter or character. This can result in a high financial cost, and is particularly uneconomic where only one character needs to be different between the two fonts. A specific example of this is a font of alphanumeric characters including a dollar symbol (and which is suitable for use in the United States of America), but which is to be employed in the United Kingdom where the entirely different sterling "pound" symbol (£) is needed. Although every other character and symbol is equally suitable for use in either of these countries, this single vital difference necessitates either forming a separate typedisc moulding or laboriously excising the "dollar" symbol (\$) and replacing it with a glued-on "pound" symbol (£). Either option is expensive. For the same reasons, there is a lack of flexibility in selection of character sets since the extra cost is about the same whether one or all characters are to be different between sets.

On the other hand, while individually replaceable characters might be technically possible, their small size and difficulties in mounting them make this solution to the problem impracticable and expensive.

The inventors of the present invention have discovered a system which is intermediate between replacing entire unitary typediscs and replacing individual characters, with the unexpected results of being easy to handle, and giving great flexibility in character selection at a cost which is very low in relation to the number of different character sets that can be assembled at the discretion of the user.

SUMMARY OF THE INVENTION

According to a first aspect of the present invention, a typedisc system comprises a central hub, at least one typedisc segment carrying a plurality of selected printing surfaces in a part-circular array, and mounting means for mounting the segment at a selected angular position on the hub and releasably securing the segment to the hub with said printing surfaces adjacent the periphery of the resultant assembly and with said part-circular array at a substantially constant radial distance from the centre of said hub.

The phrase "selected printing surface" refers to the raised surface with the mirror-image shape of the desired symbol or alphanumeric character that is to be capable of being printed onto the tape; the phrase also refers to the alternative of a utilitarian or decorative pattern which preferably has aligned edge portions such that repetitious printing of the pattern produces a continuous or visually linked strip (for example, to form a decorative border). The selected printing surfaces together form a sub-set of selected characters, symbols, and/or patterns, and may include one or more areas devoid of a raised surface so as to enable the "printing" of a blank space. Mounting of a suitable number of such segments at adjacent radial positions on the hub will form a circumferentially complete typedisc, and since individual segments can be chosen to have a selected sub-set of printing surfaces independently of any other sub-set, a multiplicity of different typediscs can be assembled from a relatively small number of different segments mounted on a single common hub. Each segment preferably has an equal angular width for uniformity of manufacture and easy interchangeability, this angular width preferably being an integral sub-multiple of 360 angular degrees such that the appropriate number of segments will form a circumferentially complete typedisc without inter-segmental gaps. This number may be between 4 and 16, and is preferably 8 which corresponds to an angular width of 45 degrees.

According to a second aspect of the present invention, there is provided an individual typedisc segment for use in a typedisc system according to the first aspect of the invention, said individual typedisc segment having a portion on which the plurality of selected printing surfaces can be formed or to which the plurality of selected printing surfaces can be secured, preferably by a permanent adhesive. This form of typedisc segment has the advantage that, apart from the printing surfaces and their immediate substrate, every segment can

be identical regardless of the sub-set it is destined to carry, and thus minimise manufacturing costs. The plurality of selected printing surfaces can then either be formed on the basic segment, or manufactured separately and then secured to the basic segment.

According to a third aspect of the invention there is provided a method of manufacturing a plurality of selected printing surfaces in a form suitable to be subsequently secured to the basic segment of the second aspect of the invention, said method utilising as starting material, a layer of photo-sensitive soluble polymer coated on an insoluble substrate, the photosensitivity of the polymer being such that photonic irradiation of the polymer can render the irradiated polymer insoluble, said method comprising the steps of subjecting those areas of the polymer which are to become the raised printing surfaces to photonic irradiation such as to render these areas insoluble, and then dissolving remaining unirradiated polymer to leave the substrate carrying the selected printing surfaces. If the substrate is not initially in an outline shape and size necessary for fitting onto the basic segment, it can be cut or otherwise formed to the requisite shape and size, either prior to forming the printing surfaces or subsequent to forming the printing surfaces. The substrate may be sheet metal. The polymer is preferably photo-sensitive to ultraviolet light, and soluble (when not irradiated) in water. Ultraviolet irradiation of the polymer conveniently takes place through a stencil or negative of the required printing surfaces. As well as rendering the polymer insoluble, ultraviolet irradiation preferably also hardens the polymer which advantageously increases the mechanical strength of the raised printing surfaces.

According to a fourth aspect of the invention, a kit of parts consists of a basic segment according to the second aspect of the invention but devoid of printing surfaces, and a portion of the starting material of the third aspect of the invention, whereby a user of this kit of parts may form a personal selection of printing surfaces. The portion of starting material is preferably pre-shaped to the shape and size requisite for fitting on to the basic segment without further alterations or trimming. The portion of starting material may have the back of its substrate pre-coated with an impact adhesive initially occluded by a peelable protective film.

According to a fifth aspect of the invention there is provided a fastener suitable for mutually securing the segment and the hub in the first aspect of the invention, said fastener comprising a stem with a head at one end of the stem and a diametrically-opposed radially-extending pair of arms at the other end of the stem, said arms being resilient in a direction parallel to the axis of the

stem, and said arms each incorporating a detent recess at the end of the arm remote from the stem, whereby said arms can cooperate with matching detent projections formed on one of the segment and the hub such that when the fastener is inserted through holes in both the segment and the hub, the fastener can be rotated to cause the detent recesses and detent projections to cooperatively mate and thereby inhibit unintended further rotation of the fastener. The head of the fastener is preferably provided with a keying means engageable by a tool to rotate the fastener. The keying means is preferably a transverse slot which can be operatively engaged by the blade of a screwdriver or by the edge of a coin. The fastener is preferably integrally moulded from a suitable polymer.

BRIEF DESCRIPTION OF THE DRAWINGS

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

Fig. 1 is a view from below of a typedisc hub with a typedisc segment mounted on the hub;

Fig. 2 is a sectional side view of the hub and segment of Fig. 1;

Fig. 3 is a plan view of the hub and segment of Fig. 1;

Figs 4 to 6 are respectively a view from below, a sectional side view, and a plan view of the segment of Fig. 1;

Fig. 7 is a view from below of a typedisc hub with an alternative form of typedisc segment mounted on the hub;

Fig. 8 is a plan view of a sheet of backing and photo-polymer for use in forming segment profiles;

Figs. 9 and 10 are perspective views of a sub-set of selected printing surfaces being affixed to a segment; and

Figs. 11 to 15 show the steps taken in a method of forming raised characters directly on a segment.

DESCRIPTION OF PREFERRED EMBODIMENTS

Referring to Figs 1 to 6 of the drawings, a typedisc 1 comprises a central hub portion 2 and a plurality of part annular interfitting segments 3 (only one being shown) arranged around the hub 2.

The hub 2 is formed of moulded plastics and is shaped to be received by the typedisc engaging portion of a lettering machine (not shown) of the type described in the previously listed Patents. An inner ring-shaped web 4 extends from the lower face of the hub 2 to engage means provided on the lettering machine for rotating the typedisc.

The segments 3, which are also formed of moulded plastics are secured to the hub 2 by means of fasteners in the form of spring clips 5 which pass through corresponding slots 6 and 7 in the hub 2 and the segments 3, respectively.

The slots 6 and 7 each feature part circular centre portions 8 and 9 for receiving a cylindrical central portion 10 of the spring clip 5.

One end portion of each clip 5 is provided with a pair of arms 11 which extend into two part annular recesses 12 and 13 provided in the lower face of each segment 3. The arms 11 and the centre portion 10 of the clip 5 are of complementary cross section to the slots 6 and 7 such that the arms 11 may pass through the slots 6 and 7.

The other end portion of the clip 5 is formed of a disc shaped head portion 14, the inner face of which abuts the upper surface of the hub 2. The head 14 is provided with a slot 13 for receiving a suitable tool, such as the blade of a screwdriver, the edge of a coin or the like. To further ensure correct location of the segments 3 on the hub 2 pairs of co-operating locating pins 16a and circular recesses 16b are provided on the hub 2 and the segments 3 respectively.

To release a segment 3 from the hub 2 the appropriate spring clip 5 is rotated such that the arms 11 lie over the slots 6 and 7 allowing the clip 5 to be withdrawn from the slots 6 and 7 and the segment 3 and the hub 2 parted. To secure a segment 3 to a hub 2 this process is carried out in reverse order.

In addition to engaging the hub 2, each segment 3 is provided with a protruding edge portion 17 for engaging a corresponding notch 18 in the edge of an adjacent segment 3.

Now referring also to Figs. 8 to 10 of the drawings raised characters (not shown), from which the lettering machine reproduces the character on a tape, are located on the planar outer edge portion 19 of the lower face of each segment 3. The characters are reproduced by means of a pressure anvil and a carbon tape which are located at a printing head of the lettering machine, the typedisc 1 being rotated on the machine to locate the correct character at the printing head.

The characters are formed of a photo-polymer mounted on a substrate or backing sheet which is affixed to the edge portion 19 of each segment 3, preferably by an adhesive.

To create a selected printing surface a layer of water soluble photo-polymer is applied to a water insoluble backing of plastics or metal from which segment profiles 41 are stamped. The profiles 41 may be affixed to segments 3 either before or after imaging, as described below, has taken place.

Portions of the water soluble polymer, in the form of the mirror image of a character it is desired to reproduce, are then exposed to ultra-violet light until the polymer has been rendered insoluble by hardening. The unexposed polymer is then washed from the backing to leave a raised character, which corresponds to the exposed portion, on the backing.

A stencil, or negative, is used to define the shape of the character.

A suitable polymer and backing combination is produced by Toyoba Petcord Co. Ltd., and the hardened polymer forms characters which are sufficiently rigid to give fine definition when the characters are used in printing.

Alternatively, raised characters 42 may be formed by a process as is shown Figs. 11 to 15 of the drawings.

In this process a segment 3 is placed in a mould 43 and the outer edge portion 19 of the segment coated with liquid photo-polymer 44. After drying the segment 3 can be removed from the mould and the outer edge portion 19, which is now sensitive to ultra-violet light, is imaged using a photo-tool 45 and an ultra-violet light source 46.

Water or a water/alcohol mix 47 is then used to wash out the unexposed polymer to leave raised characters 42 as shown in Fig. 15.

When a character is located at the print head it is necessary that the character is correctly situated to produce a level line of successive characters on the tape. To achieve this centring slots 20 are formed in the lower face of each segment 3 for engaging a locating stud which extends from the lettering machine.

The slots 20 are rectangular and are arranged in an annular band on a central portion of each segment 3.

As the characters carried on a typedisc are not necessarily of the same width it is necessary that the length of tape advanced through the printing head of the lettering machine corresponds to the width of the character which is to be printed on the tape.

The tape advancement is controlled by a cam follower, provided on the lettering machine, which engages a cam 21 formed on each of the segments 3.

Each cam 21 is substantially part-annular and is formed of a number of cam portions 22 provided with locating pins 23a to be received by equally spaced locating holes 23b provided on the lower face of each segment 3. The inner edge portion of each segment 3 also features a web 24 which supports the cam portions 22.

Each cam portion 22 produces the necessary tape advancement to print a corresponding character located on the outer edge of the segment 3. When a character on the segment 3 is changed for one of another width the cam segment 22 is also changed to provide the correct tape advancement on the lettering machine.

In addition to the inner web 4 on the hub 2 the typedisc 1 is supported on the upper face of the lettering machine by a support ring. The ring is formed of part ring shaped webs 25 which extends from the lower face of each segment 3.

The web 25 also form the inner wall of the centring slots 20 of each segment 3.

When all the segments 3 are in place the webs 25 of each of the segments 3 combine to form a ring which supports the typedisc around its outer edge. However, the typedisc 1 may also be used with only one or two segments 3 in place as each segment 3 is provided with a web 25 which provides adequate support for the incomplete typedisc.

Fig. 7 of the drawings shows an alternative form of typedisc segment 30 in which the cam 31 which controls the tape advancement of the lettering machine is formed on a face of a web 32 provided on the lower face of each of the segments 30.

This form of cam 31 is suited for use with segments 30 in which the characters are fixed to the segment 30 and thus the profile of the cam 31 does not have to be altered during the life of the segment 30.

Modifications and improvements may be made without departing from the scope of the invention.

Claims

1. A typedisc system comprising a central hub, at least one typedisc segment carrying a plurality of selected printing surfaces in a part-circular array, and mounting means for mounting the segment at a selected angular position on the hub and releasably securing the segment to the hub with said printing surfaces adjacent the periphery of the resultant assembly and with said part-circular array at a substantially constant radial distance from the centre of said hub.

2. A typedisc system as claimed in Claim 1 wherein said hub mounts a plurality of segments each of substantially equal angular width.

3. A typedisc system as claimed in Claim 2 wherein said angular width is an integral sub-multiple of 360 angular degrees such that the integral number of segments will form a circumferentially complete typedisc without intersegmental gaps.

4. A typedisc system as claimed in Claim 3 wherein said integral number is not less than four and not greater than sixteen.

5. A typedisc system as claimed in Claim 4 wherein said integral number is eight and the corresponding angular width of a segment is fortyfive angular degrees.

6. An individual typedisc segment for use in a typedisc system as claimed in Claim 1, said individual typedisc segment having a portion on which the plurality of selected printing surfaces can be formed or to which the plurality of selected printing surfaces can be secured.

7. A method of manufacturing a plurality of selected printing surfaces in a form suitable to be subsequently secured to the segment as claimed in Claim 6, said method utilising a starting material consisting of a layer of photo-sensitive soluble polymer coated on an insoluble substrate, the photosensitivity of the polymer being such that photonic irradiation of the polymer can render the irradiated polymer insoluble, said method comprising the steps of subjecting those areas of the polymer which are to become the raised printing surfaces to photonic irradiation such as to render these areas insoluble, and then dissolving remaining unirradiated polymer to leave the substrate carrying the selected printing surfaces.

8. A method as claimed in Claim 7 wherein the step of irradiation is carried out by projecting ultraviolet light through a stencil or negative of the required printing surfaces.

9. A kit of parts consisting of an individual typedisc segment as claimed in Claim 6 but devoid of printing surfaces, and a portion of the starting material as claimed in Claim 7.

10. A kit of parts as claimed in Claim 9 wherein said portion of starting material is pre-shaped to the shape and size requisite for fitting on to the basic segment without further alterations or trimming.

11. A fastener for mutually securing the segment and the hub in the typedisc system as claimed in Claim 1, said fastener comprising a stem with a head at one end of the stem and a diametrically-opposed radially-extending pair of arms at the other end of the stem, said arms being resilient in a direction parallel to the axis of the stem, and said arms each incorporating a detent recess at the end of the arm remote from the stem,

whereby said arms can cooperate with matching detent projections formed on one of the segment and the hub such that when the fastener is inserted through holes in both the segment and the hub, the fastener can be rotated to cause the detent recesses and detent projections to cooperatively mate and thereby inhibit unintended further rotation of the fastener.

5

10

15

20

25

30

35

40

45

50

55

6

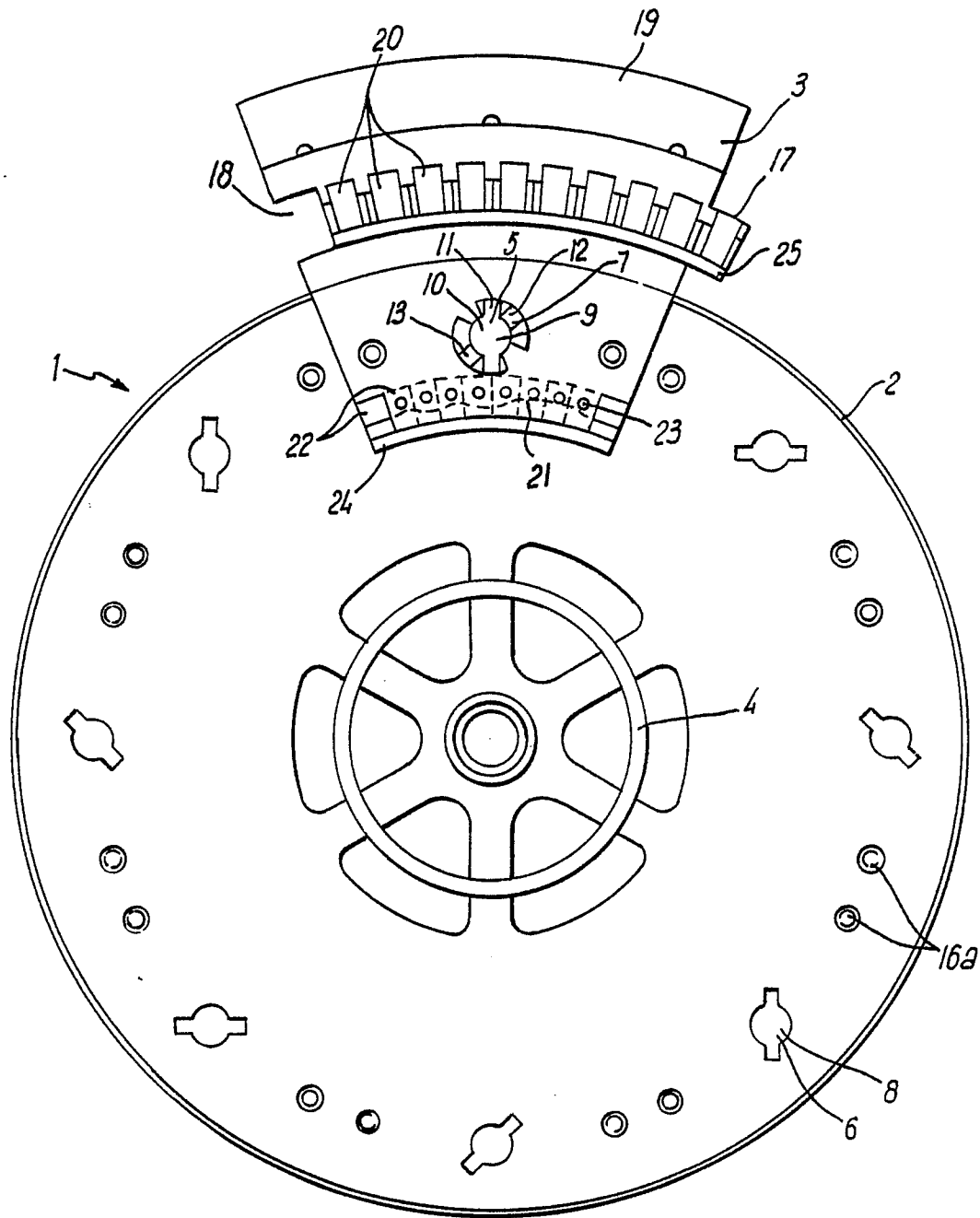


FIG. 1

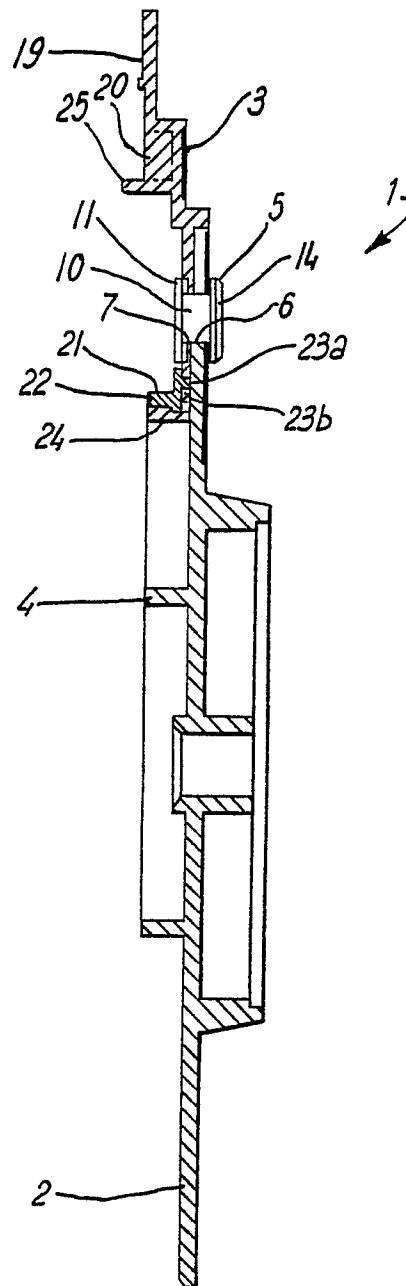


FIG. 2

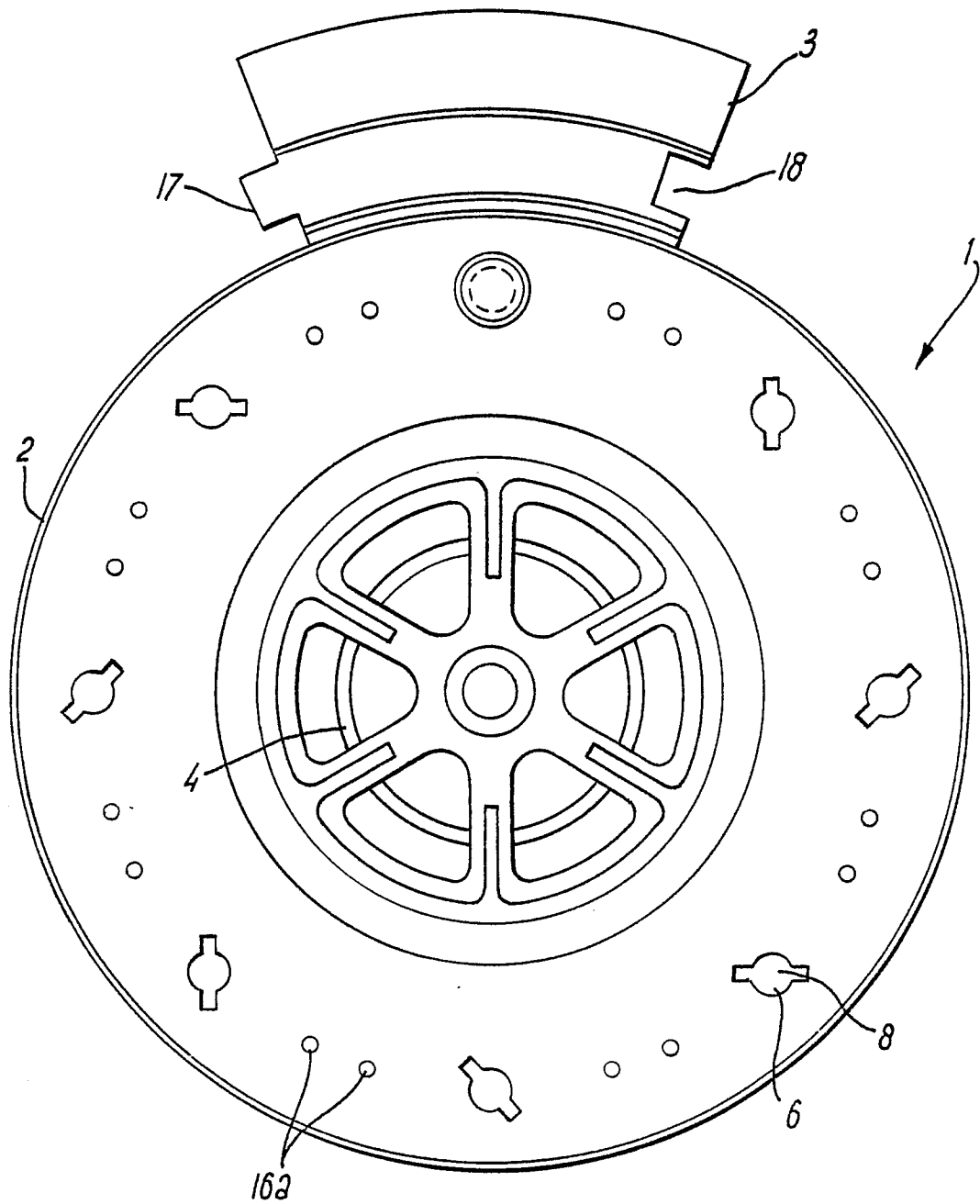


Fig. 3



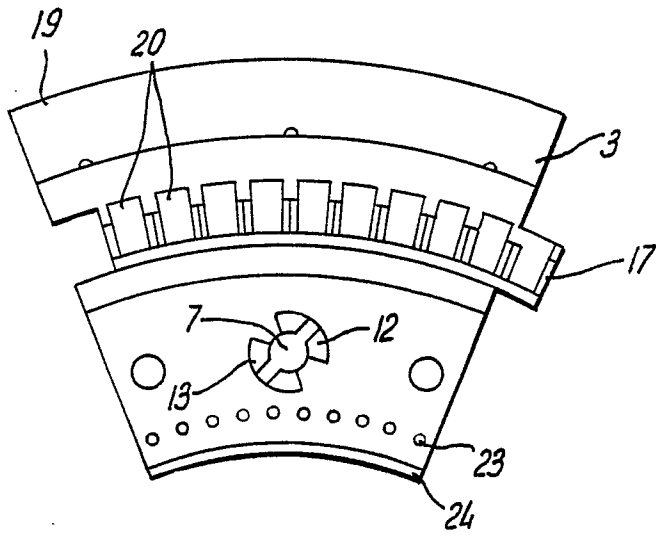


FIG. 4

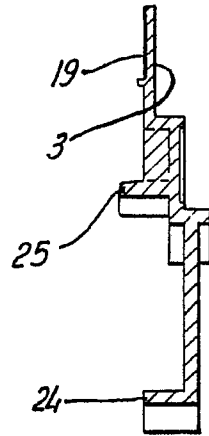


FIG. 5

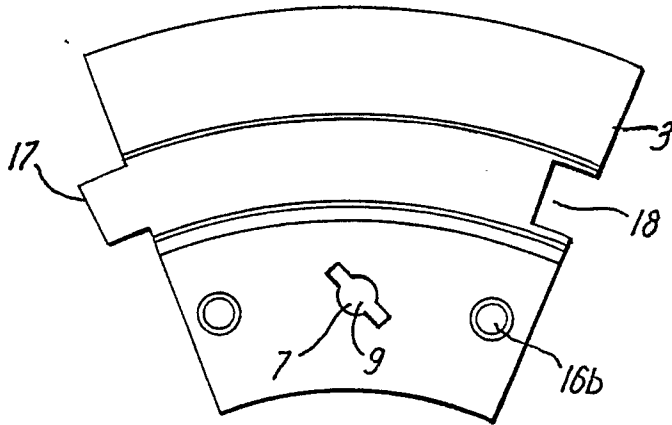


FIG. 6

Modifié par le Bureau de
Recherche et Développement 200001

0 259 994

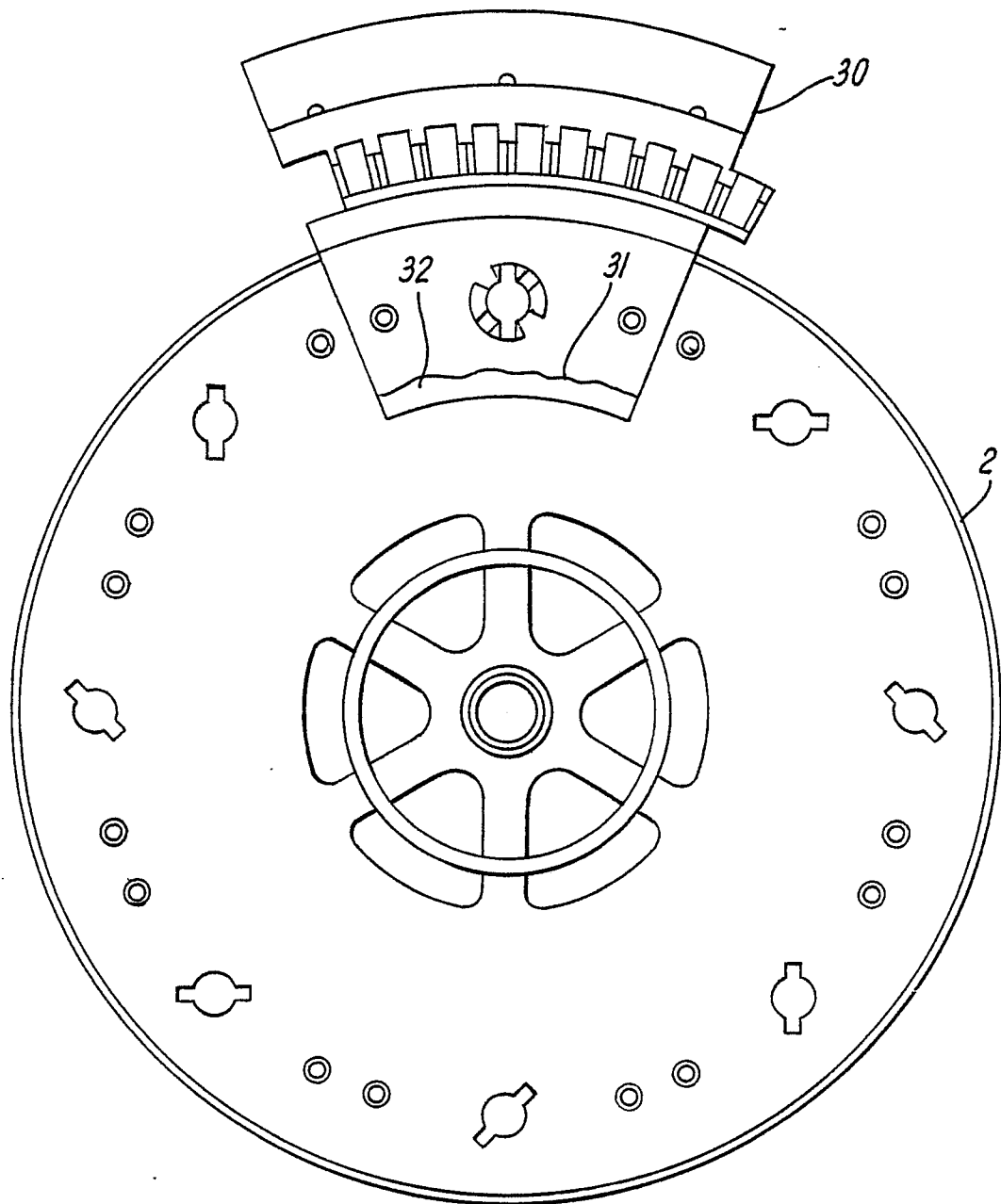


FIG. 7



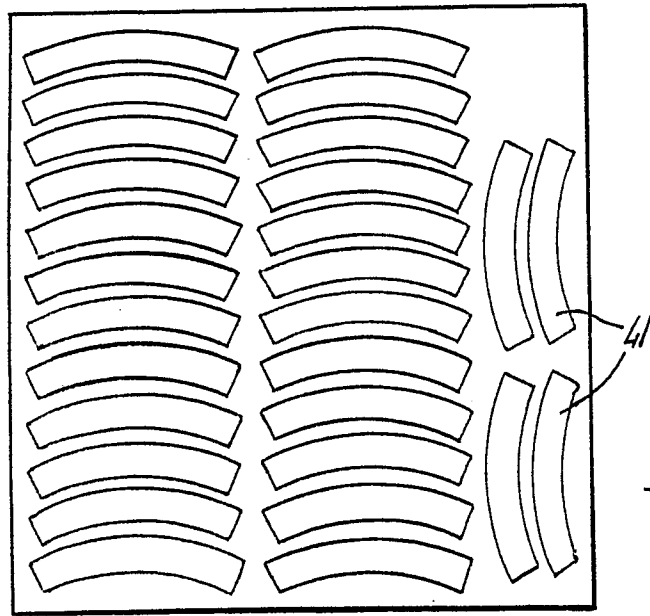


FIG. 8

Stage 1

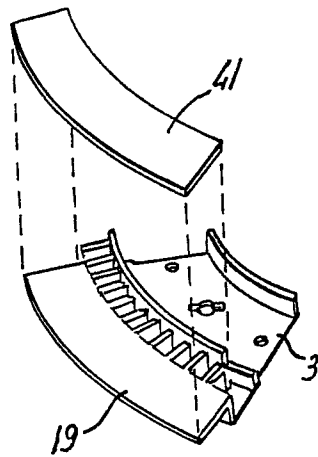


FIG. 9

Stage 2.

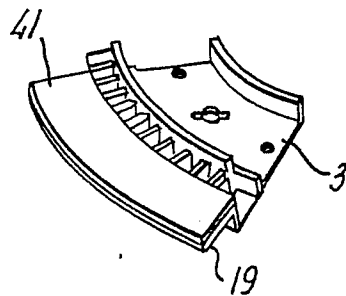


FIG. 10

Stage 3.



