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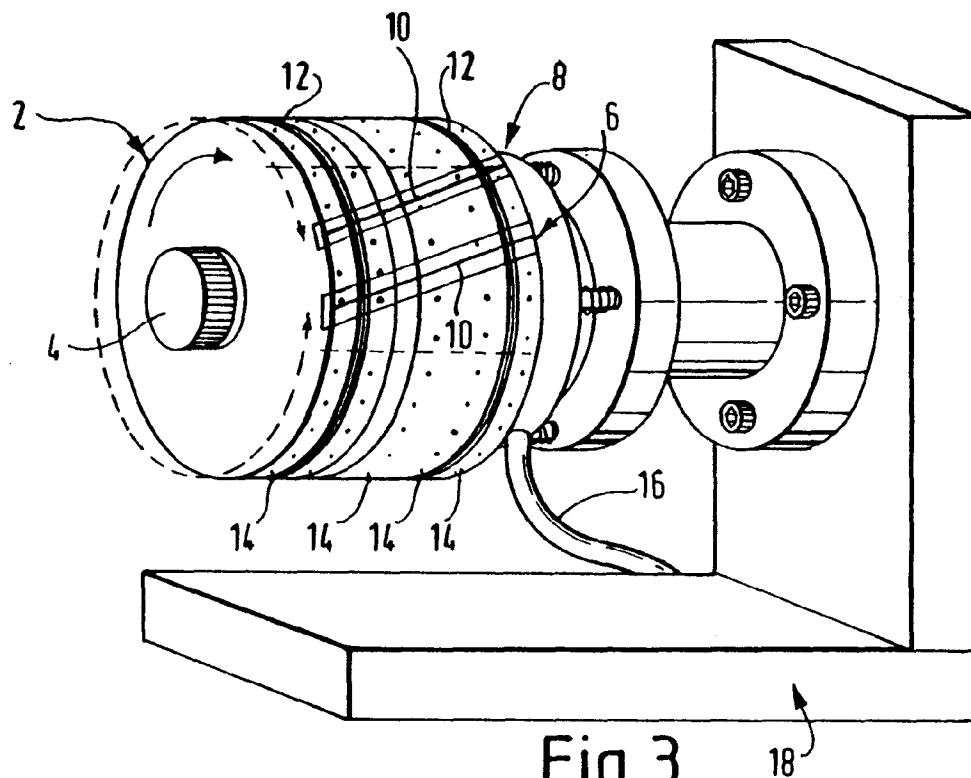
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Harrow, Middlesex HA1 4TY (GB)**(54) **Cutting apparatus**

(57) Apparatus for cutting an elongate strip of flexible material to a predetermined length and width has a drum for holding the strip on its outer surface by a vacuum. A first spaced pair of knives, co-operating with channels extending circumferentially of the drum, are aligned with markings on the strip to cut the strip to a

predetermined width and to position the markings at a predetermined distance from the edge thereof. A second pair of channels skewed longitudinally of the drum are adjustable to set a predetermined length for the strip. The longitudinal edge of the cut strip is aligned with indicia on the strip.

**Fig.3.**

18

**EP 0 936 036 A2**

## Description

### Field of the Invention

[0001] This invention relates to cutting apparatus, and in particular to apparatus for cutting, or trimming, an elongate strip of flexible material.

### Background of the Invention

[0002] It is often required to cut a strip of material to length and to width, and this is usually done on a flat surface. One example of this is in the photographic field, where a loop in the form of an endless belt, or stencil, is used to dispose markings on photographic material. An elongate strip of transparent material is marked periodically adjacent one edge with a bar code that carries information that identifies the particular product, for example by identifying the manufacturer and type of emulsion it contains. The strip is laid out on a table and cut to a predetermined length and then to a predetermined width. The longitudinal cut has to be made so as to leave the bar code at a predetermined distance from the edge. The strip is then formed into a loop, for example by welding its ends together ultrasonically. The loop is supported so as to rotate in a vertical plane and photosensitive material, for example a long length of film, is passed therebeneath. A light source within the loop shines onto the surface of the film and disposes an image of the bar code thereon. After the film has been exposed, it is fed into a photographic processor. The processor reads the bar code and is then able to determine the correct conditions for development and printing of the film. To do this, it is important that the bar code be accurately aligned with the edge of the film, which is detected by the processor. Error of alignment can lead to error in the processing conditions.

### Problem to be Solved by the Invention

[0003] It is one object of the present invention to provide cutting apparatus for strip material that allows accurate cutting of the strip to length and to width, so that subsequent use of the strip is facilitated, for example in depositing indicia from the strip onto other articles.

[0004] The invention finds particular, though not exclusive, application in the photographic field in the preparation of a transparent strip of material for subsequent forming into a loop to be used for printing bar codes onto photosensitive material.

### Summary of the Invention

[0005] In accordance with one aspect of the present invention, there is provided apparatus for cutting an elongate strip of flexible material, comprising:

a cylindrical support member, preferably rotatably

mounted;

means for securing the strip tightly around the circumferential surface of the support member;

two transverse cutting means spaced apart from one another around the circumferential surface of the support member and movably mounted with respect to each other, thereby to allow the strip to be cut to a predetermined circumferential length; and two longitudinal cutting means spaced apart from one another axially along the circumferential surface of the support member, thereby to allow the strip to be cut to a predetermined width.

[0006] The means for securing the strip to the support member may be a vacuum arrangement, whereby the strip is sucked onto the circumferential surface.

[0007] Preferably, one of the transverse cutting means is fixedly mounted with respect to the support member.

[0008] This allows the other transverse cutting means to be adjusted so as to give accurate separation therebetween, and thus accurate determination of the cut length of the strip.

[0009] Advantageously, at least part of each transverse cutting means, for example a channel for guiding a cutting edge thereof, is mounted in the cylindrical surface of the support member. In operation, the strip is laid over the channel and a blade drawn therethrough to effect the cutting, for example in a manual operation.

[0010] The transverse and longitudinal cutting means may be arranged to make respective cuts in straight lines at other than 90° to each other. In this way, the ends of the strip when brought together for sealing, for example by ultrasonic welding, do not form a seal at right angles to the length of the strip.

[0011] The longitudinal cutting means are preferably at a fixed distance apart. The cutting of the strip to the required width is advantageously carried out by bringing cutting edges up to the secured strip and then rotating the support member against them.

[0012] The cutting apparatus advantageously comprises means for aligning the longitudinal cutting means with respect to an indicator on the strip of material. The aligning means may comprise means for displaying the indicator and the relative position of the longitudinal cutting means, for example a VDU. The position of the support member, or drum, can then be adjusted until the indicator is at the required spacing from the adjacent longitudinal cutting means.

[0013] The elongate strip of material may be transparent and the indicator may be opaque. This is particularly suitable when the strip is subsequently to form a stencil for marking photosensitive material.

[0014] The indicator may be repeated along the length of the strip.

[0015] The indicator may comprise a bar code. In the above-mentioned photographic application, the indicator may contain information relevant to the subsequent

processing of the material, such as the manufacturer and the specific product type.

[0016] In accordance with another aspect of the present invention, there is provided a method of cutting an elongate strip of flexible material, comprising:

securing the strip tightly around the circumferential surface of a cylindrical support member;  
adjusting the spacing between two transverse cutting means that are spaced apart from one another around the circumferential surface of the support member to a predetermined distance;  
cutting the strip to a predetermined circumferential length with the transverse cutting means; and  
cutting the strip to a predetermined width with two longitudinal cutting means that are spaced apart from one another axially along the circumferential surface of the support member.

[0017] The cutting of the strip to the predetermined width is preferably carried out by using a display screen to align the longitudinal cutting means with a indicator on the strip.

#### Advantageous Effect of the Invention

[0018] By supporting the elongate strip on a cylindrical surface, that is to say along a curve approximating the closed loop into which the article is later formed, the cutting of both the length and the width is achieved more accurately.

[0019] The cutting of the strip can be carried out sequentially on the one piece of apparatus. A plurality of strips cut with the same apparatus are assured to be of precisely the same length and width.

[0020] Alignment of indicia on the strip with the longitudinal cutting means thus accurately defines their positioning with respect to the longitudinal edge of the cut strip. Subsequently, this allows for the indicia to be accurately positioned by means of the strip, acting as a master, on further articles, such as photosensitive material.

#### Brief Description of the Drawings

[0021] Cutting apparatus, in accordance with the present invention, will now be described, by way of example, with reference to the accompanying drawings, in which:

Figure 1 is a front elevation of the apparatus;  
Figure 2 is a side elevation of the apparatus;  
Figure 3 is an isometric view of a support arrangement of the apparatus;  
Figure 4 is an enlarged isometric view of a cutting assembly of the apparatus; and  
Figure 5 shows a plan view of a portion of an elongate strip for use with the apparatus.

#### Detailed Description of the Invention

[0022] Referring to Figures 1 to 4 of the drawings, the cutting apparatus has a cylindrical support drum 2 of diameter 21 inches, mounted axially on a horizontal shaft 4. Cutting blocks 6,8 are countersunk into the outer surface of the drum 2 to extend completely along the length thereof, skewed with respect to the axis of the shaft 4. Each block 6,8 has a straight channel 10 extending therealong, and the block 8 is movably mounted so that its spacing from the block 6 can be adjusted. Two further channels 12 extend circumferentially around the drum 2 at a spacing of 60mm. A large number of holes 14 in the circumferential surface of the drum 2 are connected by means of a conduit 16 to a vacuum pump (not shown).

[0023] The holes 14 lie within and beyond the channels 12. The drum 2, on its shaft 4, is mounted on a movable jig 18.

[0024] A cutting assembly 20 is affixed to the jig 18 and is controlled by a knob 22 to dispose a pair of knives 24, that are fixed at 60mm separation, within the circumferential drum channels 12.

[0025] A viewing arrangement 26 is disposed above the drum 2, and has a lens system 28 that can be focused on the surface of the drum 2 to project an image onto a screen 30.

[0026] Referring to Figure 5, an elongate transparent strip 32 is of approximate length 60.5 inches and width greater than 60mm. The strip 32 contains a repeating number of opaque bar codes 34 adjacent, but not extending to, one of its edges, the bars being symmetrical about a centreline 36.

[0027] In operation, a partial vacuum is applied via the conduit 16 to the surface of the drum 2. The strip 32 is laid around the drum 2 so as to cover the cutting channels 6,8 and 12 and the holes 14, and is initially retained in place by the light vacuum. The viewing lens system 28 is adjusted to focus the bar code 34 onto the screen 30, and the jig 18 is moved until the bar code centreline 36 is aligned with a mark 38 on the screen 30 that represents the position of the neighbouring one of the cutting knives 24 of the assembly 20. The vacuum is then increased so as to hold the strip 32 securely in its set position on the surface of the drum 2. In this position, the bar code centreline 36 is located at a predetermined distance from the adjacent cutting knife 24. The cutting assembly 20 is then moved into contact with the strip 32 over the circumferential channels 12, and the drum 2 is rotated to effect the cutting of the strip 32 to its predetermined width, 60mm. Cutting knives (not shown) are then drawn by hand through the skewed channels 6,8 to cut the strip 32 to its predetermined length. During the cutting operations, the applied vacuum holds not only the required final portion of the strip 23 but also the waste material, on either side of the channels 6,8 and 12, thus enhancing the sharpness of the cut edges. The vacuum is then released and the required portion of the

accurately-cut strip 32 removed for its ends to be ultrasonically welded together to form a closed loop, or belt. The belt is now ready for marking photosensitive material with the bar codes 34.

**[0028]** A plurality of strips may be cut on the apparatus, and each will be of precisely the same length and width.

**[0029]** It will be appreciated that forms of clamping other than by the use of a vacuum may be employed to secure the strip on the support drum.

## Claims

1. Apparatus for cutting an elongate strip of flexible material, comprising:
  - a cylindrical support member;
  - means for securing the strip tightly around the circumferential surface of the support member;
  - two transverse cutting means spaced apart from one another around the circumferential surface of the support member and movably mounted with respect to each other, thereby to allow the strip to be cut to a predetermined circumferential length; and
  - two longitudinal cutting means spaced apart from one another axially along the circumferential surface of the support member, thereby to allow the strip to be cut to a predetermined width.
2. Apparatus according to claim 1, wherein the means for securing the strip to the support member comprises a vacuum arrangement.
3. Apparatus according to claim 1 or claim 2, wherein one of the transverse cutting means is fixedly mounted with respect to the support member.
4. Apparatus according to any one of the preceding claims, wherein at least part of each transverse cutting means is mounted in the cylindrical surface of the support member.
5. Apparatus according to claim 4, wherein each cutting means comprises a channel for guiding a cutting edge thereof.
6. Apparatus according to any one of the preceding claims, wherein the transverse and longitudinal cutting means are arranged to make respective cuts in straight lines at other than 90° to each other.
7. Apparatus according to any one of the preceding claims, wherein the longitudinal cutting means are at a fixed distance apart.
8. Apparatus according to any one of the preceding claims, comprising means for aligning the longitudinal cutting means with respect to an indicator on the strip of material.
9. Apparatus according to claim 8, wherein the aligning means comprises means for displaying the indicator and the relative position of the longitudinal cutting means.
10. Apparatus according to claim 8 or 9, comprising the elongate strip of material, wherein the strip is transparent and the indicator is opaque.
11. Apparatus according to claim 10, wherein the indicator is repeated along the length of the strip.
12. Apparatus according to claim 10 or claim 11, wherein the indicator comprises a bar code.
13. A method of cutting an elongate strip of flexible material, comprising:
  - securing the strip tightly around the circumferential surface of a cylindrical support member;
  - adjusting the spacing between two transverse cutting means that are spaced apart from one another around the circumferential surface of the support member to a predetermined distance;
  - cutting the strip to a predetermined circumferential length with the transverse cutting means; and
  - cutting the strip to a predetermined width with two longitudinal cutting means that are spaced apart from one another axially along the circumferential surface of the support member.
14. A method according to claim 15, wherein indicia on the strip are aligned with the longitudinal cutting means, thereby to position the indicia at a predetermined spacing from the cut edge of the strip.

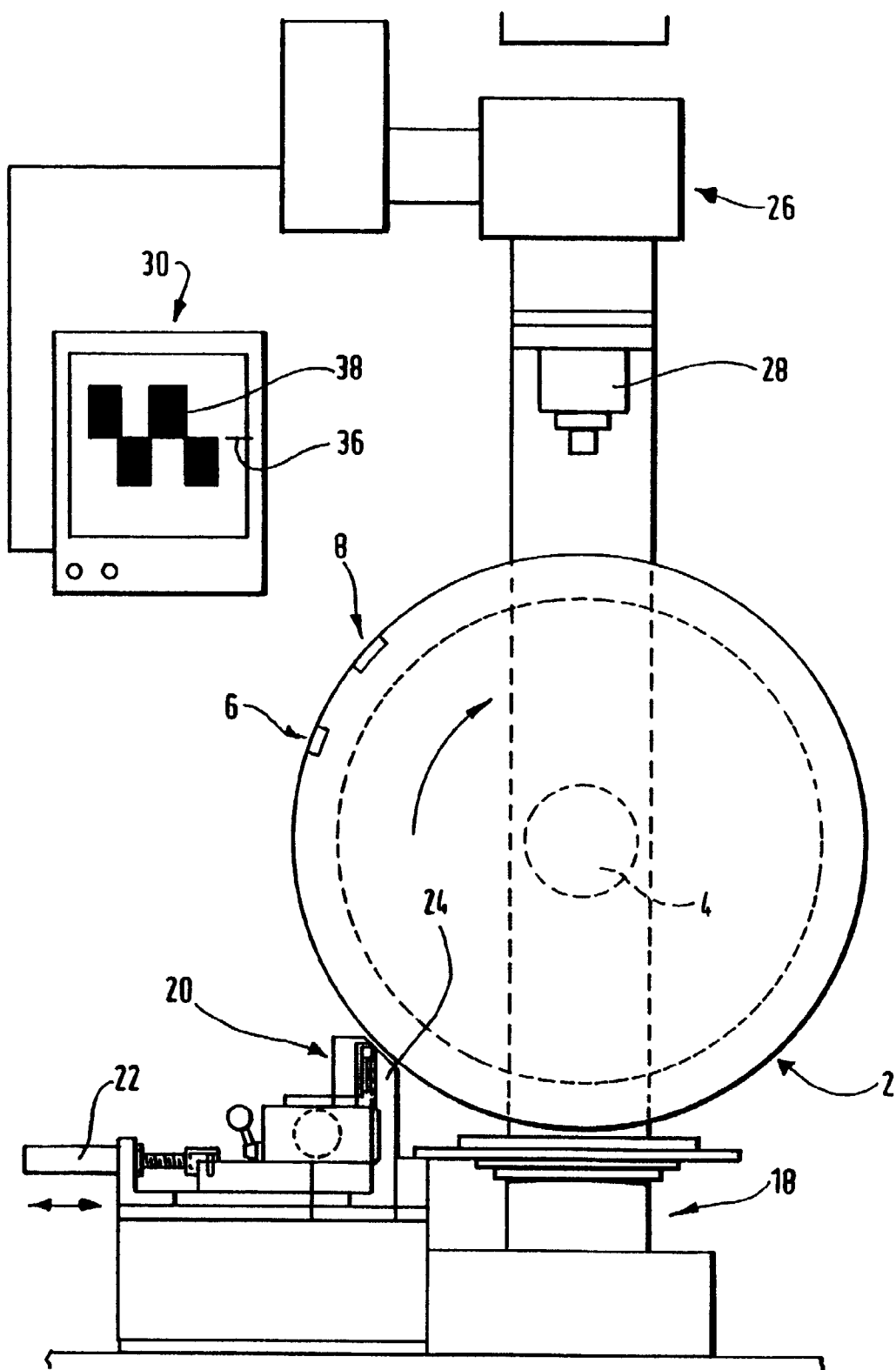


Fig.1.

