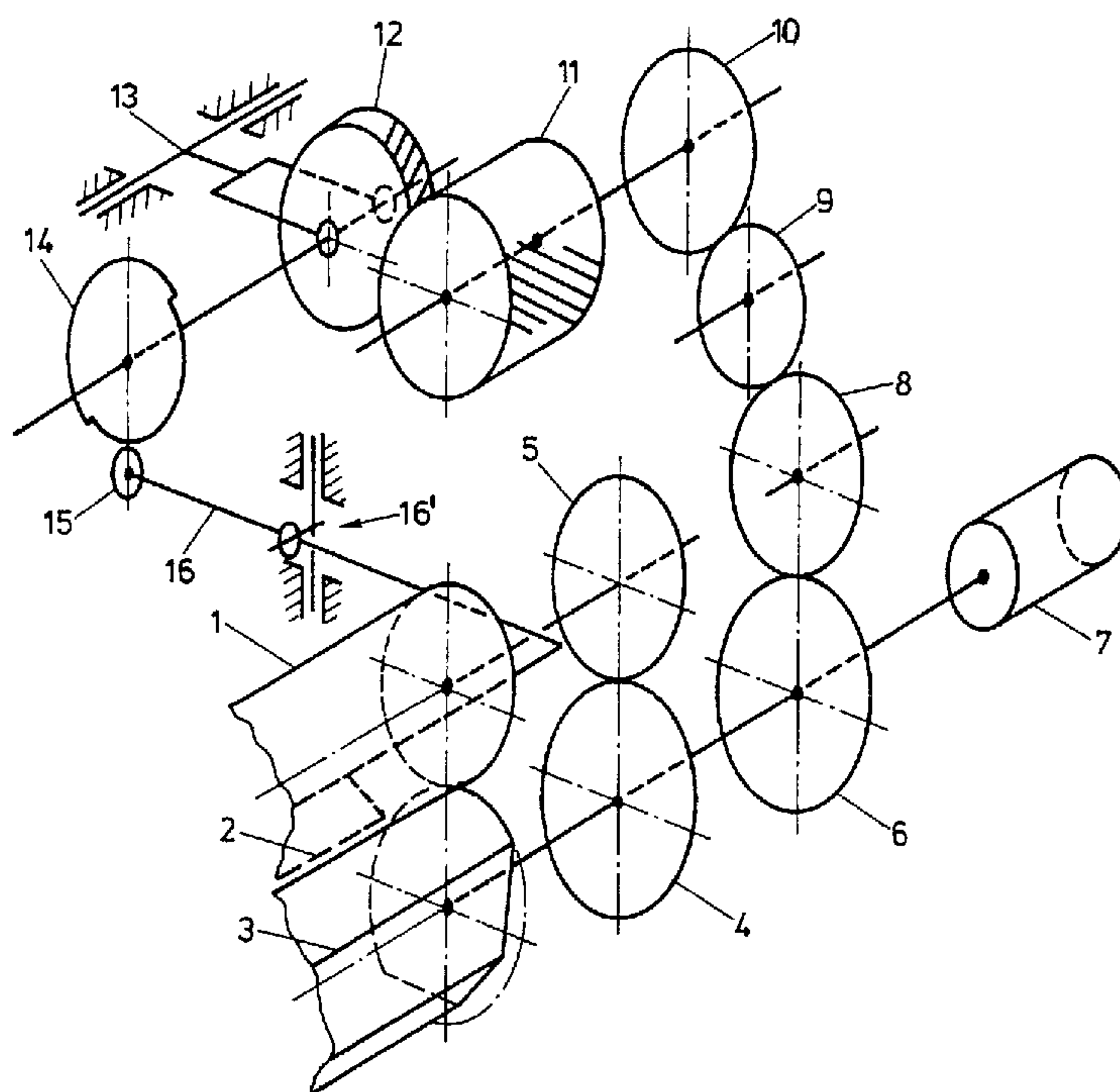




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(54) **GROUPE DE SERIGRAPHIE**
(54) **SCREEN PRINTING INSTALLATION**



(57) L'invention concerne un groupe de sérigraphie comprenant un écran rond (1), dans lequel est disposée une racle (2), et une surface de contre-pression (3). Ledit groupe comporte un dispositif synchronisé avec le dispositif d'entraînement de l'écran (1) et de la surface de contre-pression (3), qui sert à l'élévation commandée de la racle (2) et présente au moins une came (14) qui met la racle (2) dans la position souhaitée, par l'intermédiaire d'un levier de racle (16).

(57) The invention relates to a screen printing installation having a round screen (1) with a squeegee (2) and a counterpressure surface (3) fitted inside. Said installation has a device which is synchronized with the screen drive (1) and the counterpressure surface (3). This device controls the lifting off of the squeegee (2), and has at least one cam (14) which moves the squeegee (2) into the desired position by means of a squeegee lever (16).



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(54) Title: **SCREEN PRINTING INSTALLATION**

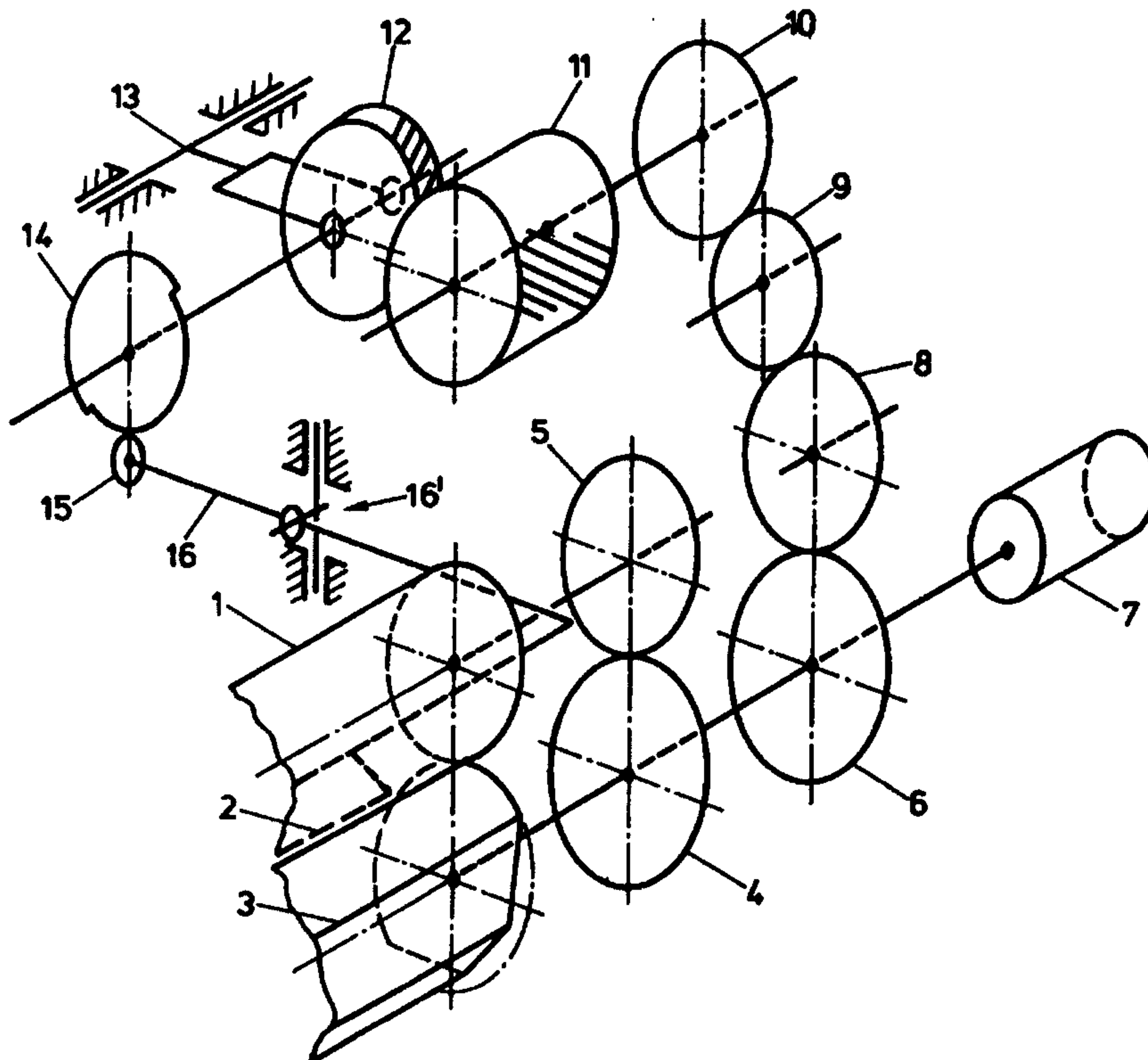
(54) Bezeichnung: **SIEBDRUCKWERK**

(57) Abstract

The invention relates to a screen printing installation having a round screen (1) with a squeegee (2) and a counterpressure surface (3) fitted inside. Said installation has a device which is synchronized with the screen drive (1) and the counterpressure surface (3). This device controls the lifting off of the squeegee (2), and has at least one cam (14) which moves the squeegee (2) into the desired position by means of a squeegee lever (16).

(57) Zusammenfassung

Beim Siebdruckwerk mit Rundsieb (1), darin angeordneter Rakel (2) und Gegendruckfläche (3) ist eine mit dem Antrieb vom Sieb (1) und Gegendruckfläche (3) synchronisierte Einrichtung zum gesteuerten Abheben der Rakel (2) vorgesehen, welche mindestens eine Kurvenscheibe (14) aufweist, welche über einen Rakelhebel (16) die Rakel (2) in die gewünschte Stellung bewegt.



SCREEN PRINTING INSTALLATION

The present invention relates to screen printing apparatus comprising a circular screen with a squeegee within it, further to an impression cylinder for the circular screen, drive means and a system for detaching the squeegee during printing, as defined in the preamble of claim 1.

10 Screen printing apparatus of this kind is known and their circular screens are designed for discontinuous web printing or for sheet-fed printing. Illustratively a screen printing apparatus of this kind is described in the European patent document 0,723,864 A.

 In such procedures, when in the discontinuous web printing mode, the gap between printing end and printing beginning of the next print shall be minimal because of the expensive printing materials. Commensurately when in the sheet-fed mode, the distance between the front paper edge
20 to the beginning of print also shall be minimal.

 As regards optimal solutions of such problems with printing speeds becoming ever higher, increasing difficulties are encountered to move the squeegee in very short cycles 10 ms. Due to the interaction of different inks and patterns, that is different demands for inks, the apparatus requires extraordinary dynamics not easily controlled. Also, as regards circular screens, the ink runs through the screen in the stationary mode (open sites; the pattern is situated over the full periphery).

30 It was possible to solve this complex problem for screen printing apparatus of the initially defined kind by

a design defined by the features of claim 1 of the present invention.

The solution of the invention furthermore allows very high operational speeds at short times of displacement, namely by means of the adjustment of the invention of the cam disks. Such mechanical controls and appropriate designs allow markedly reducing the squeegee's inertial forces.

Thanks to the cam disk, the (adjustable) squeegee
10 pressure is generated mechanically, and this feature allows substantial increases in speed as compared with pneumatic controls for instance.

The cam disk is adjustable also in operation at its periphery with respect to the beginning of printing in order to attain the least spacing between printing end and beginning of printing. The effects of ink and of ink removal can be compensated by such adjustability. The adjustability, or the setting, is initiated by bevel gearing (adjustment inside the synchronizing system).

20 The circular screen may comprise in its null position a closed zone to preclude ink leakage. Preferably an ink-level regulator is used so that only minimal ink shall be needed in the screen.

Especially advantageous embodiments of the object of the invention are defined in the dependent claims.

The screen printing apparatus of the invention is elucidated below in relation to the drawings.

Fig. 1, in purely diagrammatical manner, shows a screen printing apparatus integrated on a sheet-fed press,

Fig. 2 is a view similar to Fig. 1 with a rotary screen printing apparatus on a web-fed press with a reciprocating web transport,

Fig. 3 diagrammatically shows a rotary screen printing apparatus integrated on a substrate printing machine, with plane or cylindrical substrates,

Fig. 4 is a diagrammatic sketch of a synchronized drive for a circular screen with controlled squeegee and the impression cylinder in a mechanical embodiment one side
10 of the machine, and

Fig. 5 also is a purely diagrammatical view of a rotary silk printing apparatus with discontinuous squeegee pressure (in the absence of impression pressure).

Figs. 1 through 3 of the drawing illustrate the principles of various rotary screen printing methods.

Fig. 1 shows a rotary screen printing apparatus integrated on a sheet-fed press. The circular screen 1 is fitted or not with an indentation 1'. The squeegee 2 mounted inside the screen is linked to an omitted device
20 lifting the squeegee 2 in controlled manner. A sheet 5 that can be gripped by a gripper 4 rests on the impression cylinder 3. When the gripper 4 projects from the pit of the impression cylinder, the circular screen 1 will be provided with an indentation 1' (for instance in the form of a cross-strip with an uncovered zone for the projecting gripper 4 at the impression cylinder 3). When the gripper 4 is countersunk (not shown), the circular screen does not need an indentation. However in both cases the squeegee 2 must be lifted above the indentation 1' or the pit with
30 countersunk gripper 4.

Fig. 2 diagrammatically shows a rotary screen printing apparatus integrated on a web-fed press with reciprocating web transport. An impression cylinder 3 with an uncovered zone 3' is present beside the circular screen 1 with squeegee 2 (with a linked, omitted device to lift the squeegee in controlled manner). In this embodiment the squeegee 2 must be lifted each time above the uncovered zone 3' because of the web being drawn back (reciprocation).

10 Fig. 3 shows the principle of a rotary screen printing apparatus integrated on a substrate printing machine. In this design too the circular screen 1 is fitted with a squeegee 2 raised in controlled manner. The substrates (impression cylinders) to be printed may be plane bodies 3 (for instance glass plates) moved on a conveyor belt 4 or they may be cylindrical bodies 5 (for instance bottles).

 The substrates 3 or 5 to be printed form the impression cylinders. The squeegee 2 must be raised when
20 between the individual substrates.

 Fig. 4 shows a synchronized drive system for the circular screen 1, the squeegee 2 and the impression cylinder 3 (in this case an impression cylinder with an uncovered zone of a reciprocating machine) of a screen printing apparatus.

 The synchronized drive system is situated on one side of the printing apparatus. However a further cam disk with a lever controlling the squeegee 2 may be provided on the other side of the circular screen 1.

30 The synchronized drive system for the circular screen 1, squeegee 2 and impression cylinder 3 is

substantially implemented by means of the following components: driven by a motor 7, the gears 4, 5 move the circular screen 1 and the impression cylinder 3.

The motor 7 in this design drives the printing apparatus. In principle such a drive also may be delivered by the main machine shaft.

The gears 6 through 10 drive a bevel gear 11 which is part of the control system for the squeegee 2.

10 The cam disk 14 is driven by a further bevel gear 12 which is positioned in transversely displaceable manner by an adjusting mechanism 13. Thanks to bevel gear, this adjusting mechanism 13 allows highly accurately setting the phase of the cam disk 14 (also during operation).

The contour of the cam disk 14 may be fixed or variable, for instance by consisting of two mutually rotatable panes.

The squeegee is controlled, i.e. lifted, by means of an idler roller 15 and the squeegee lever 16, which illustratively is a kind of rocking lever pivoted about the
20 point 16'. Because of the support at point 16', the squeegee pressure can be made adjustable. In the case of two cam-disk panes, the squeegee 2 is held in place and is controlled more precisely and the compression is more easily regulated.

Besides the purely mechanical design of the drive system, a hybrid electro-mechanical design also may be used.

Fig. 5 is a design similar to that of Fig. 4, that is, it shows a rotary screen printing system with
30 discontinuous squeegee pressure. In this embodiment, the circular screen 1, the squeegee 2, or the control cam disks

14, and the impression cylinder 3 (shown as a reciprocating device) are driven by three mutually independent motors 17, 18, 19, as a result of which maximum adjustment flexibility is attained when in synchronization.

In this design also the cam disks 14 may assume a fixed or a variable contour as discussed above in relation to Fig. 4 and the squeegee pressure can be adjusted at the squeegee-lever's fulcrum 16'.

The squeegee pressure can be adjusted during
10 operation (printing, see paper web 20).

The squeegee 2 always must be lifted in the absence of an opposing pressure, as otherwise the circular screen 1 might be damaged.

Thanks to the independent drives means, the circular screen for instance may be rotated into a position precluding the leakage of ink, however it may especially be driven in a suitable manner to insert the screen at an arbitrary, appropriate position.

WHAT IS CLAIMED IS:

1. Screen printing apparatus comprising a circular screen with a squeegee therein, an impression surface for the circular screen, drive means and systems to lift the squeegee in controlled manner during printing, where the squeegee control system comprises at least one cam disk to move the operational squeegee by means of a squeegee lever into the particular desired position and the
10 various components of the printing apparatus are operationally and synchronously connected to each other by a mechanical gear system, characterized in that the basic adjustment of the cam disk is implemented by means laterally displacing two mutually engaging bevel gears in the drive gears for the cam-disk shaft.

2. Screen printing apparatus as claimed in claim 1, characterized in that two identical cam disks mounted parallel to each other on a common shaft are provided for each squeegee and drive two squeegee levers
20 which in turn enter from both sides the circular screen drum to engage the squeegee.

3. Screen printing apparatus as claimed in either of claims 1 and 2, characterized in that means are provided to adjust the squeegee compression in the normal operational position.

4. Screen printing apparatus as claimed in one of claims 1 to 3, characterized in that the contour of each of the cam disks is fixed.

5. Screen printing apparatus as claimed in one of claims 1 to 3, characterized in that the contour of each of the cam disks is variable, for instance in that their basic design consists of two mutually oppositely rotatable panes.

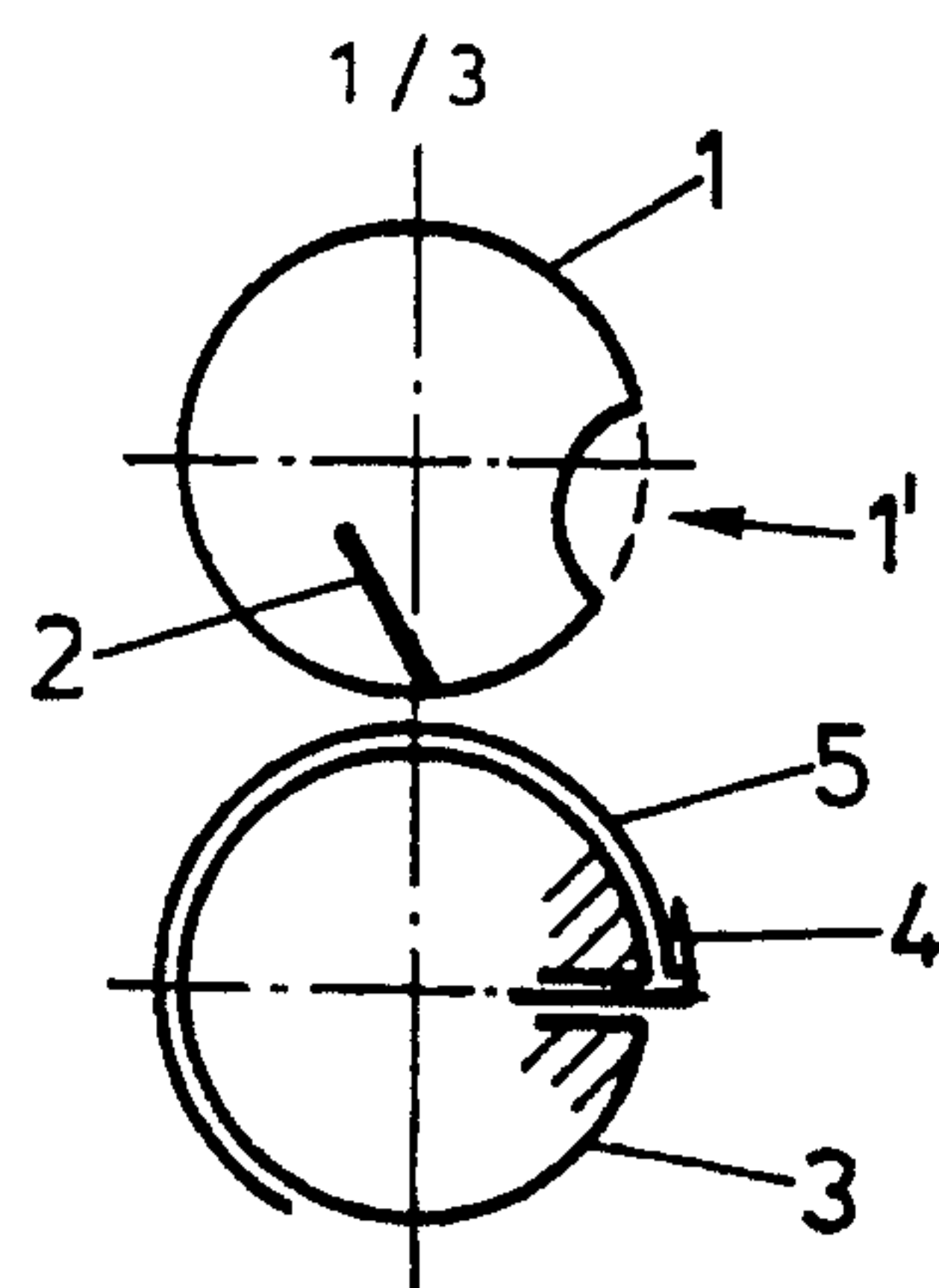


FIG.1

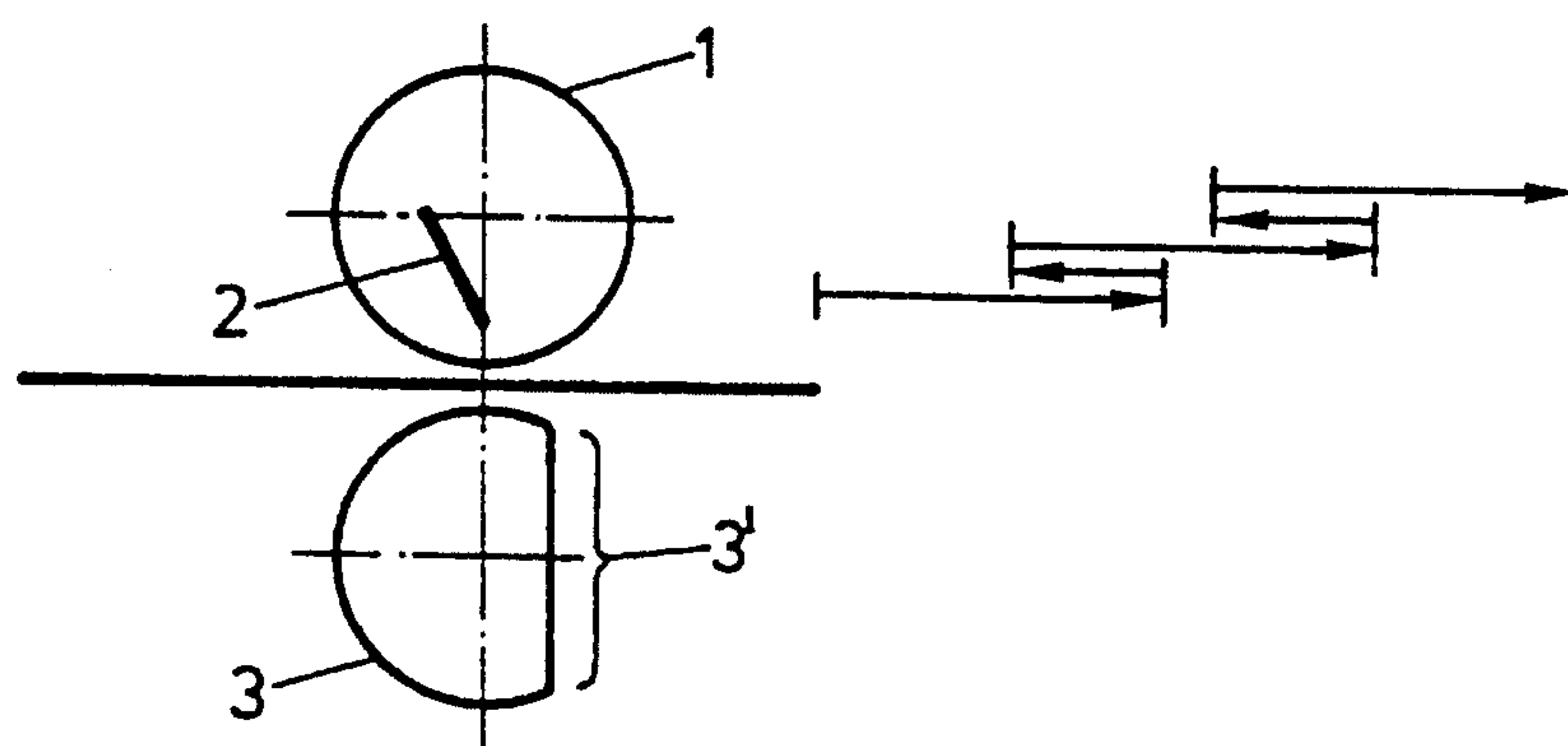


FIG.2

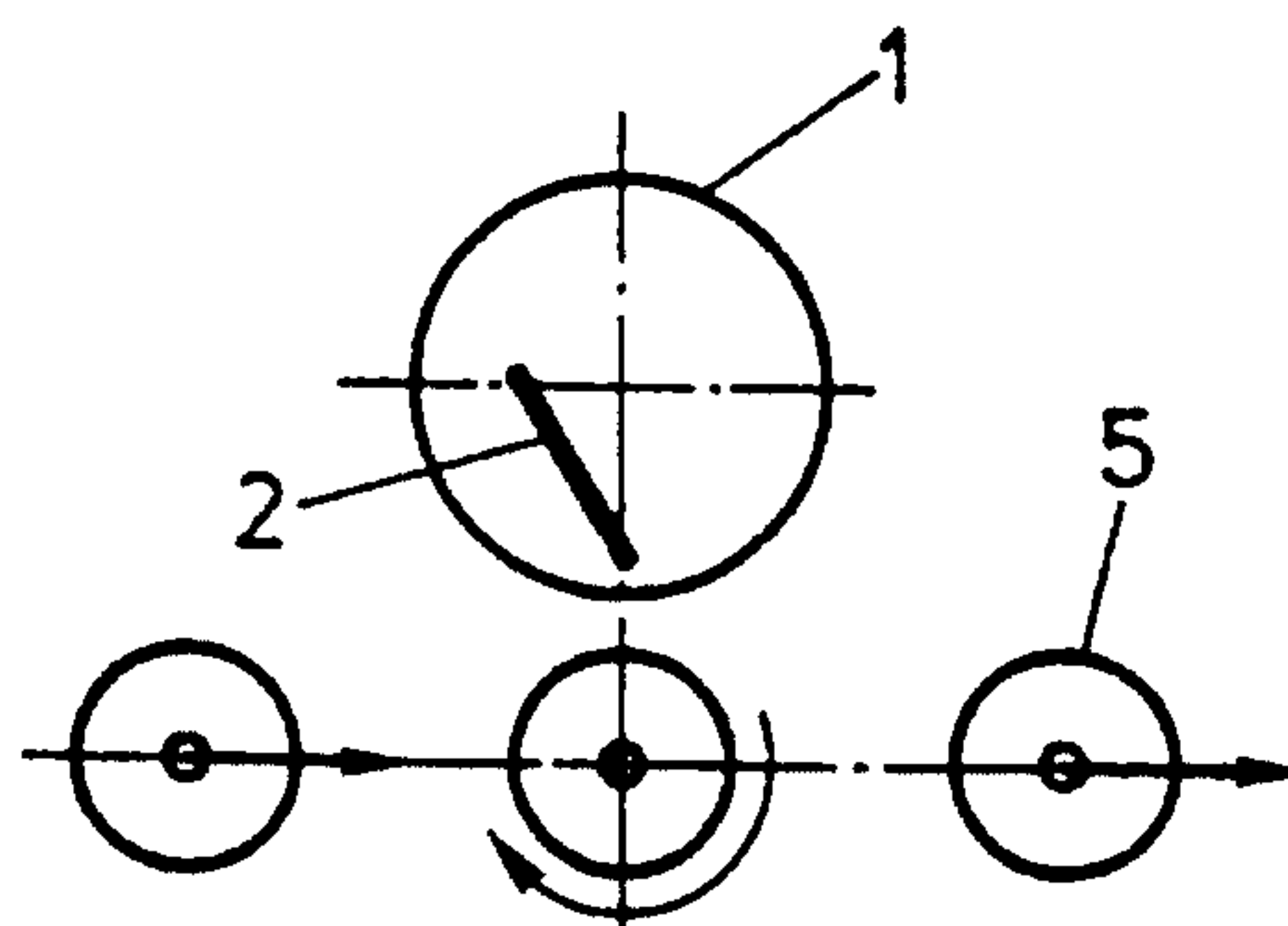
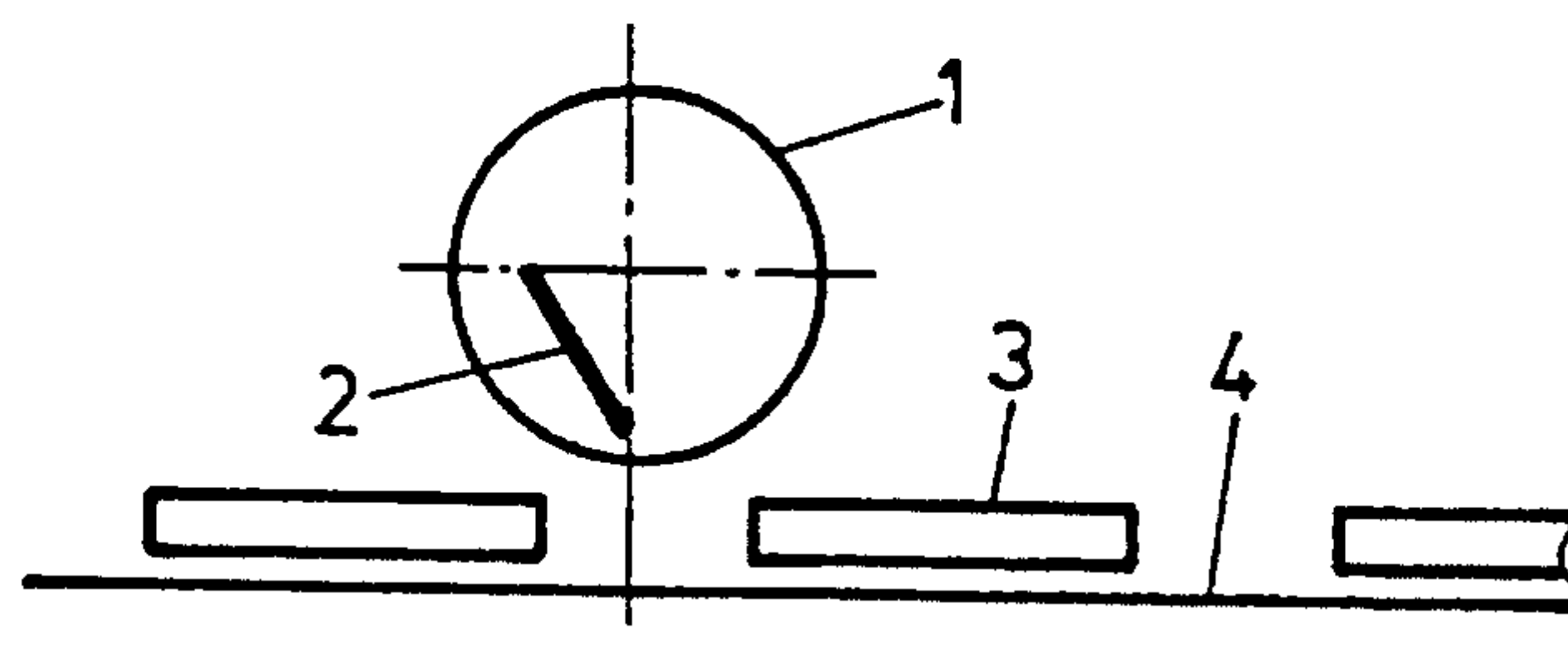


FIG.3

2/3

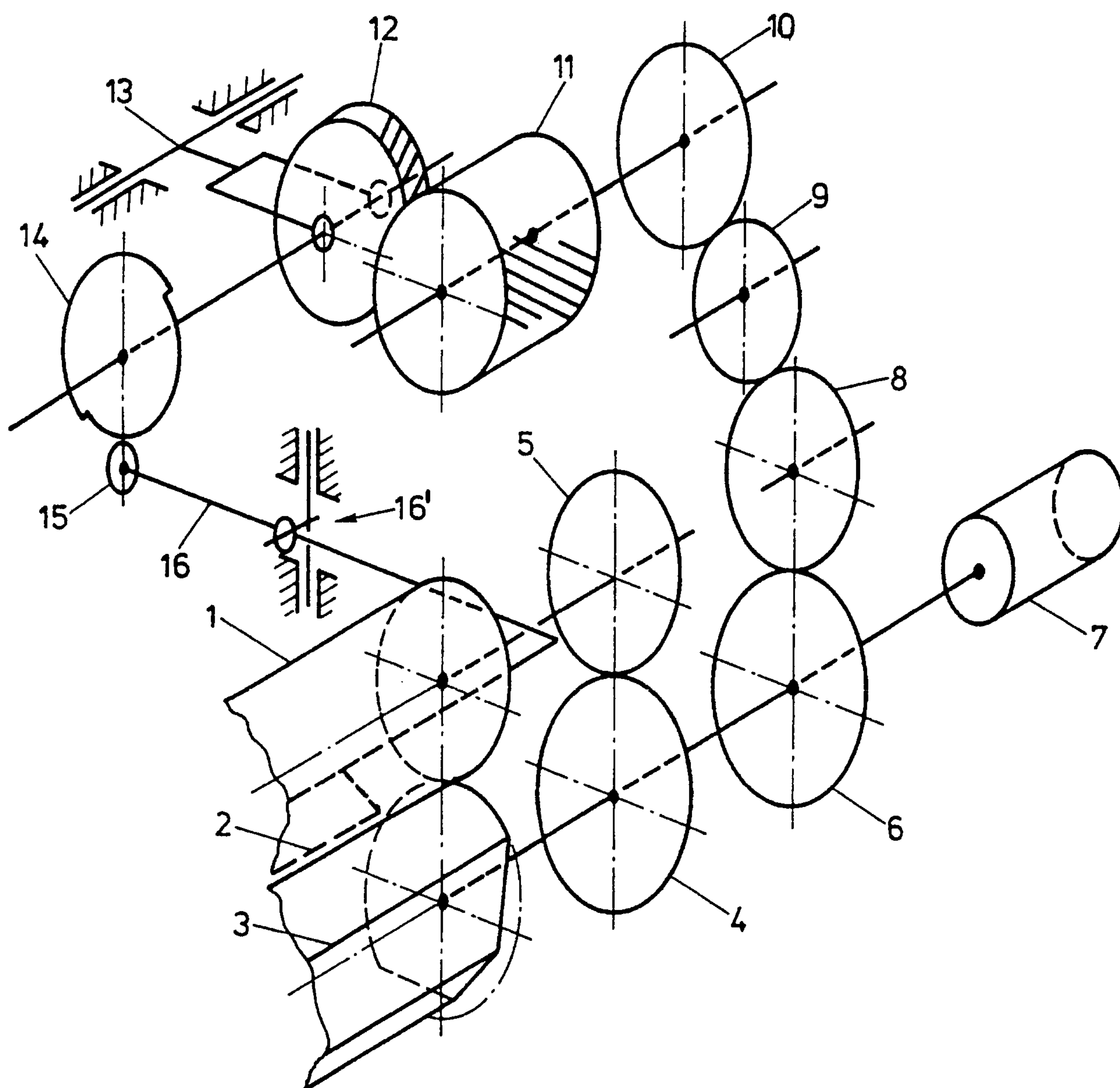


FIG. 4

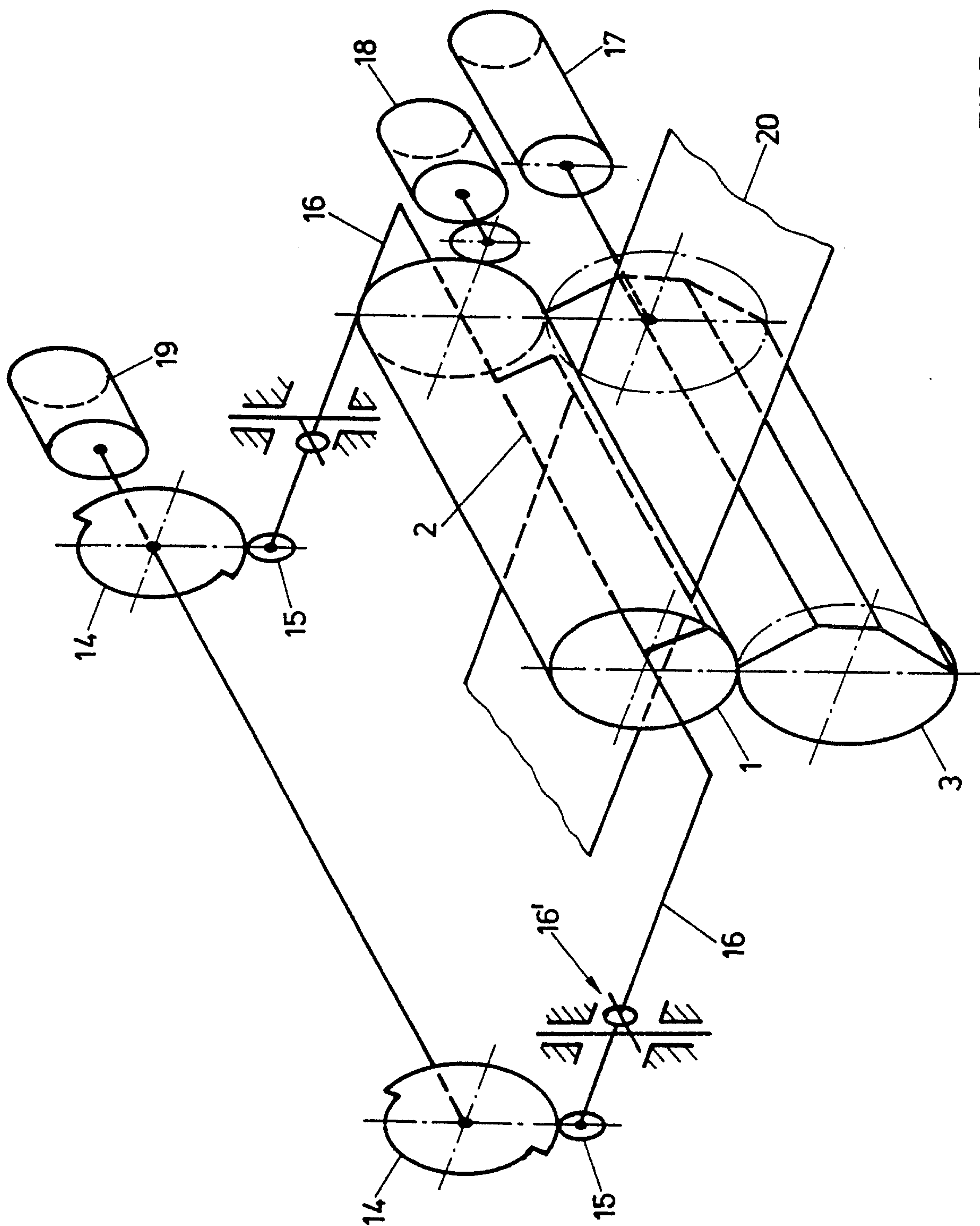


FIG. 5