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(71) Applicant: **TECNO 5 - SOCIETA' A RESPONSABILITA' LIMITATA**
Via Micheli, 7
I-43056 S. Polo di Torrile (Parma)(IT)

(72) Inventor: **Bortolani, Giovanni Maria**
Via Pianello, 7
I-43042 Berceto (Parma)(IT)

(74) Representative: **Corradini, Corrado et al**
Studio Ing. C. CORRADINI & C. S.r.l. 4, Via Dante Alighierieri
I-42100 Reggic Emilia(IT)

(54) Centre unit for machines for the multi-colour siik-screen printing of cylindricai containers in generai.

(57) A centre unit for silk-screen printing machines incorporating a loading station (20) for the containers (3) to be printed, at least two printing stations (2) and a discharge station (21) for the printed containers, said at least four stations being angularly equidistant along a circular path, tangential to which the printing station screens (22) slide and along which, with stepwise movements of an angular width equal to the width by which said stations are distributed, there rotate an equal number of radial mandrels (5, 51) which support the containers by virtue of a vacuum created within them, comprises, associated with each mandrel (5, 51) a pair of identical parallel guides (61) to be arranged symmetrical about and parallel to the longitudinal axis of said mandrel (5, 51) and projecting beyond the front end (51) of this latter where they support a slider (6) provided centrally with an interchangeable rotatable support (151) aligned with the respective mandrel and caused to slide with forward and backward movement by a lateral pneumatic unit (7).

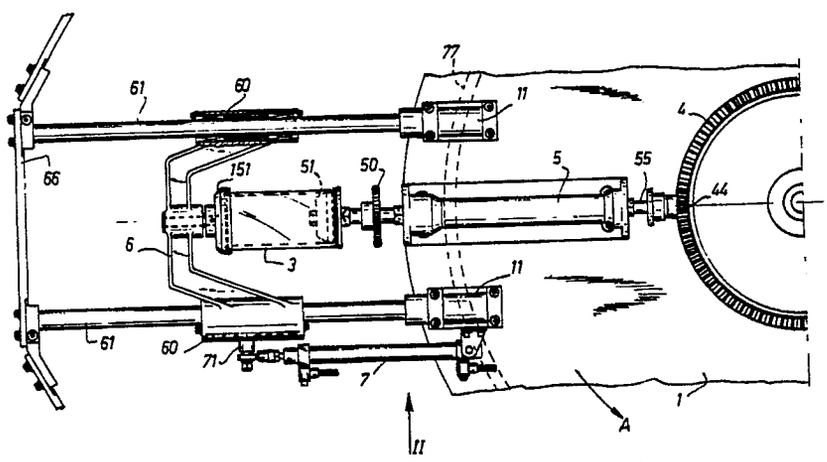

FIG.1

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CENTRE UNIT FOR MACHINES FOR THE MULTI-COLOUR SILK-SCREEN PRINTING OF CYLINDRICAL CONTAINERS IN GENERAL

This invention relates to a centre unit for printing machines for multi-colour silk-screen printing on cylindrical containers in general.

Machines for the multi-colour silk-screen printing of such containers have been known for some time, comprising a horizontal platform with which a container loading station, at least two printing stations and a container discharge station are associated, these stations being arranged angularly equidistant along the circular path followed by the mandrels which support the containers to be printed.

The mandrels are provided in a number equal to the number of said stations and are arranged radially to said circular path, respective screens being associated with said at least two printing stations to slide tangentially to said circular path.

In such known machines, the mandrels consist of a plug over which the containers are tightly forced so that they are juttingly supported by the respective mandrel.

The known machines of the aforesaid type, to which the invention relates, are of little sophistication and have a relatively low productivity and cost.

They have however operational limits in the sense that as the bodies to be printed are juttingly supported they must necessarily be of small axial dimensions.

The object of the present invention is to associate with each individual mandrel, without creating constructional complications in the other parts of the machine, a rear support arranged to cooperate with the mandrel in supporting the containers being processed, in order to allow even relatively lengthy and/or heavy containers to be printed without their undergoing undesirable movement relative to the mandrels and consequently relative to the screens.

Said object is attained by the invention as characterised in the accompanying claims.

The characteristics and constructional merits of the invention will be apparent from the detailed description given hereinafter with reference to the accompanying figures in which:

Figure 1 is a plan view of the invention associated with a mandrel of a multi-colour silk-screen printing machine;

Figure 2 is a view in the direction II of Figure 1;

Figure 3 is a partial plan view of a printing machine equipped with the invention.

Said figures, and in particular Figures 1 and 3, show a circular ring structure 1 of vertical axis rotated with stepwise movement in the direction A by a convenient intermittent drive unit, not shown because of usual type.

With reference to Figure 3, in the illustrated case the printing machine is provided with six printing stations indicated overall by 2, a loading station 20 for the stations 3 and a container discharge station 21, said two loading and discharge stations being provided with convenient means for gripping the containers, such as gripper members swinging in vertical planes radial to said ring structure 1.

Essentially, said stations are spaced angularly apart by 45° and the ring structure 1 is rotated through equal steps, a container being loaded for printing and a printed container being simultaneously discharged during the halt periods of the ring structure.

As can be seen, within the ring structure 1 there is a fixed ring gear 4, with eight identical radial mandrels being arranged circumferentially equidistant along the outer circumferential edge of the ring structure.

Each mandrel comprises a tube 5 which is fixed onto said ring structure 1, and in which a shaft 55 is rotatably mounted to project beyond the two ends of the tube 5.

On the rear end of the shaft 55 there is fixed a gear wheel 44 which engages with the ring gear 4 (see Figures 1, 3), and on the front of the shaft 55 there are fixed an interchangeable gear wheel 50 and an interchangeable plug 51. This latter can be tightly forced into the mouth of the container 3, the front end part of the shaft 55 comprising a coaxial hole (not shown) to be connected to a convenient pneumatic circuit. This latter, which is not shown because of known type, can apply vacuum to the container 3 to pull it against the plug 51 and hence support it, and can then break the vacuum in the container 3 to allow it to be discharged.

It should also be noted that the interchangeable gear wheel 50 has a pitch circle diameter equal to the outer diameter of the containers 3, and the gear wheel 44 has a pitch circle diameter equal to 1/8 of the pitch circle diameter of the ring gear 4, for obvious reasons.

According to the invention, with each plug 51 there is associated an interchangeable coaxial front support 151 or centre unit, which keeps the container 3 elastically thrust against the plug 51 to thus ensure perfect horizontal positioning of the container during printing.

Said interchangeable support 151, which comprises a recess for receiving the base of the container 3 (see Figure 1), is mounted rotatable at the centre of a slider 6 consisting of a fork-shaped body with its concavity facing the plug 51.

As can be seen in Figure 1, the ends of the arms of said fork-shaped body 6 are provided with respective sleeves 60 slidingly mounted on two cylindrical bars 61 which are parallel to each other and to the common axis of said plug 51 and support 151.

Each pair of bars 61 is arranged symmetrically about the corresponding tube 5, with the two bars 61 fixed to the ring structure 1 by convenient fixing devices 11. Finally, between one of said fixing devices 11 and the corresponding sleeve 60 there is interposed a double-acting pneumatic cylinder-piston unit 7, the outward and return strokes of which are governed by an underlying pneumatic valve 70 (see Figure 2). This latter is controlled by a circular cam 77 supported by a fixed element 10 of the machine (Figure 2), the point 71 at which the cylinder-piston unit 7 is connected to the slider 6 comprising a screw clamp (see Figures 1, 2) which enables said connection point to be adjusted. Finally, it should be noted that all the bars 61 are connected together by a stiffening polygonal frame 66.

With reference to Figure 3 a description will now be given in summary terms, as they are well known to the expert of the art, of the elements associated with each printing station 2 of the machine equipped with the invention. Each station 2 comprises a usual screen 22 above rich there is a usual spatula 23, these being supported by respective overlying radial levers 24, These latter have their inner ends connected to respective raising/lowering devices and to respective exclusion devices (not visible), their outer ends being hinged to the top of a common column 25. In addition, the inner edge of each screen 22 is slidingly supported by one of said radial levers 24, and the outer edge of the same screen 22 is hinged to a slide 26, this being slidingly mounted on a corresponding pair of superposed cylindrical bars 27.

Finally, as can be best seen in Figure 2, a rack 28 arranged to engage with the gear wheels 50 is associated with the inner edge of each screen 22, the screen support slides 26 being connected together by a lever system indicated overall by 29.

The operation of the machine is not described as this is well known to the expert of the art.

Claims

1. A centre unit for silk-screen printing machines comprising a loading station (20) for the containers (3) to be printed, at least two printing stations (2) and a discharge station (21) for the printed containers, said at least four stations being angularly equidistant along a circular path, tangential to which the printing station screens (22) slide and along which, with stepwise movements of an angular width equal to the width by which said stations are distributed, there rotate an equal number of radial mandrels (5, 51) which support the containers by virtue of a vacuum created within them, characterised by comprising a pair of identical parallel guides (61) to be arranged symmetrical about and parallel to the longitudinal axis of a mandrel (5, 51) and projecting beyond the front end (51) of this latter where they support a slider (6) provided centrally with an interchangeable rotatable support (151) aligned with the respective mandrel and caused to slide with forward and backward movement by a pneumatic unit (7) positioned to the side of said guides (61).

2. A unit as claimed in claim 1, characterised in that said slider (6) comprises a fork-shaped body having its concavity facing the corresponding mandrel.

3. A unit as claimed in the preceding claims, characterised in that said pneumatic unit (7) consists of a double-acting pneumatic cylinder-piston unit, of which at least one of the fixing points is connected to the corresponding connection member by an adjustable device (71).

4. A machine for the multi-colour silk-screen printing of cylindrical containers in general, characterised by comprising at least one centre unit as claimed in the preceding claims.

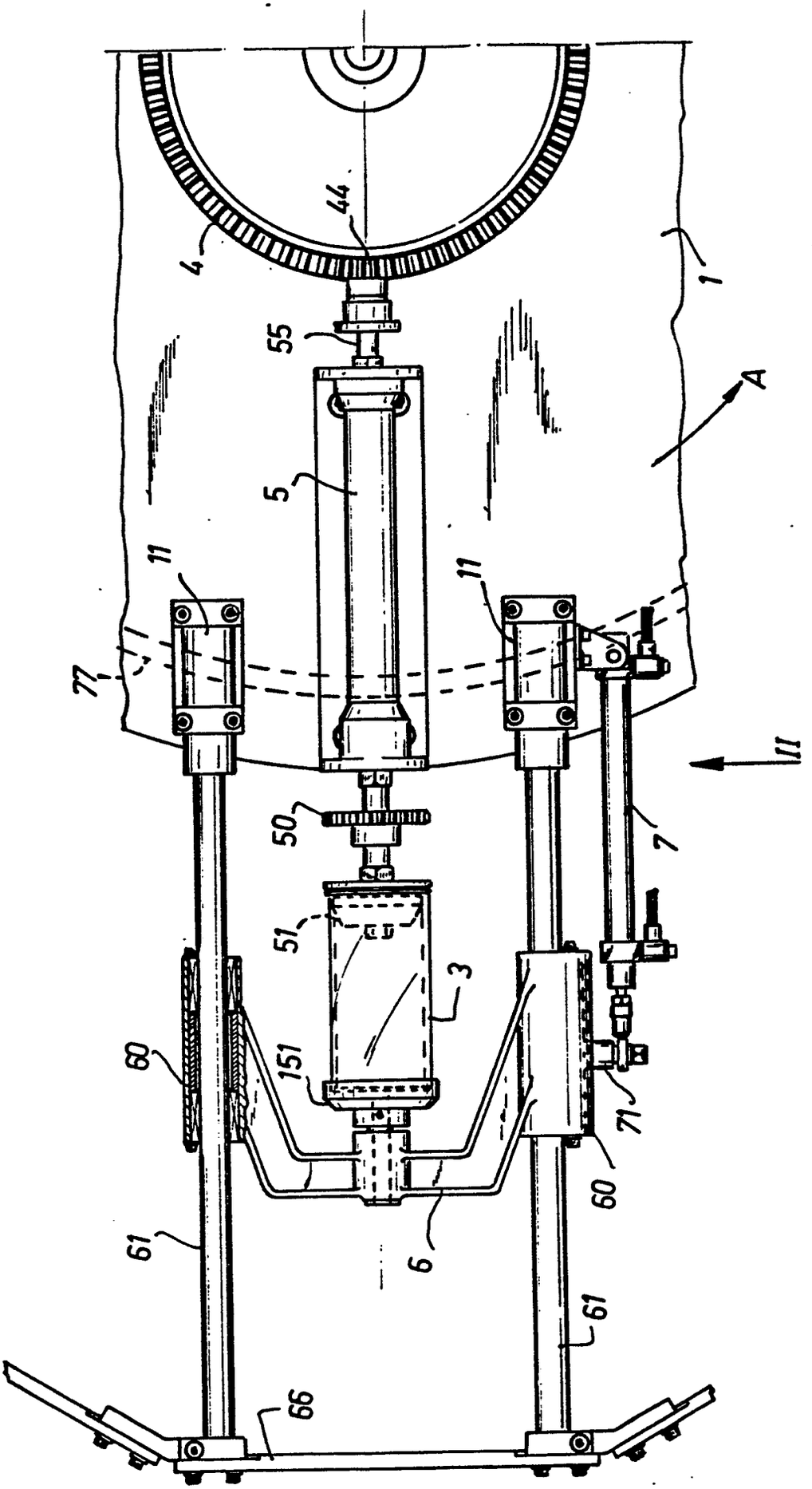

FIG.1

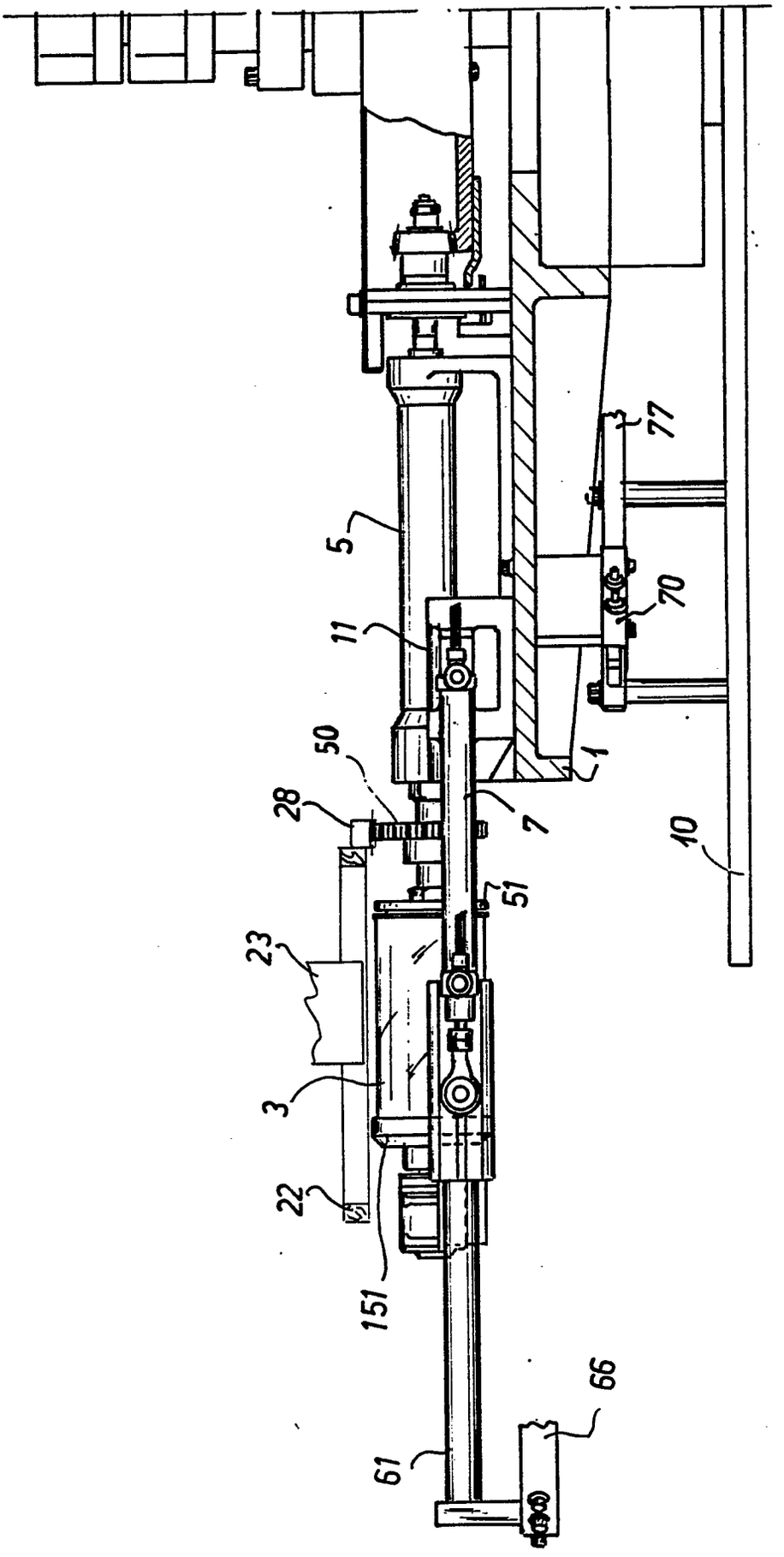

FIG. 2

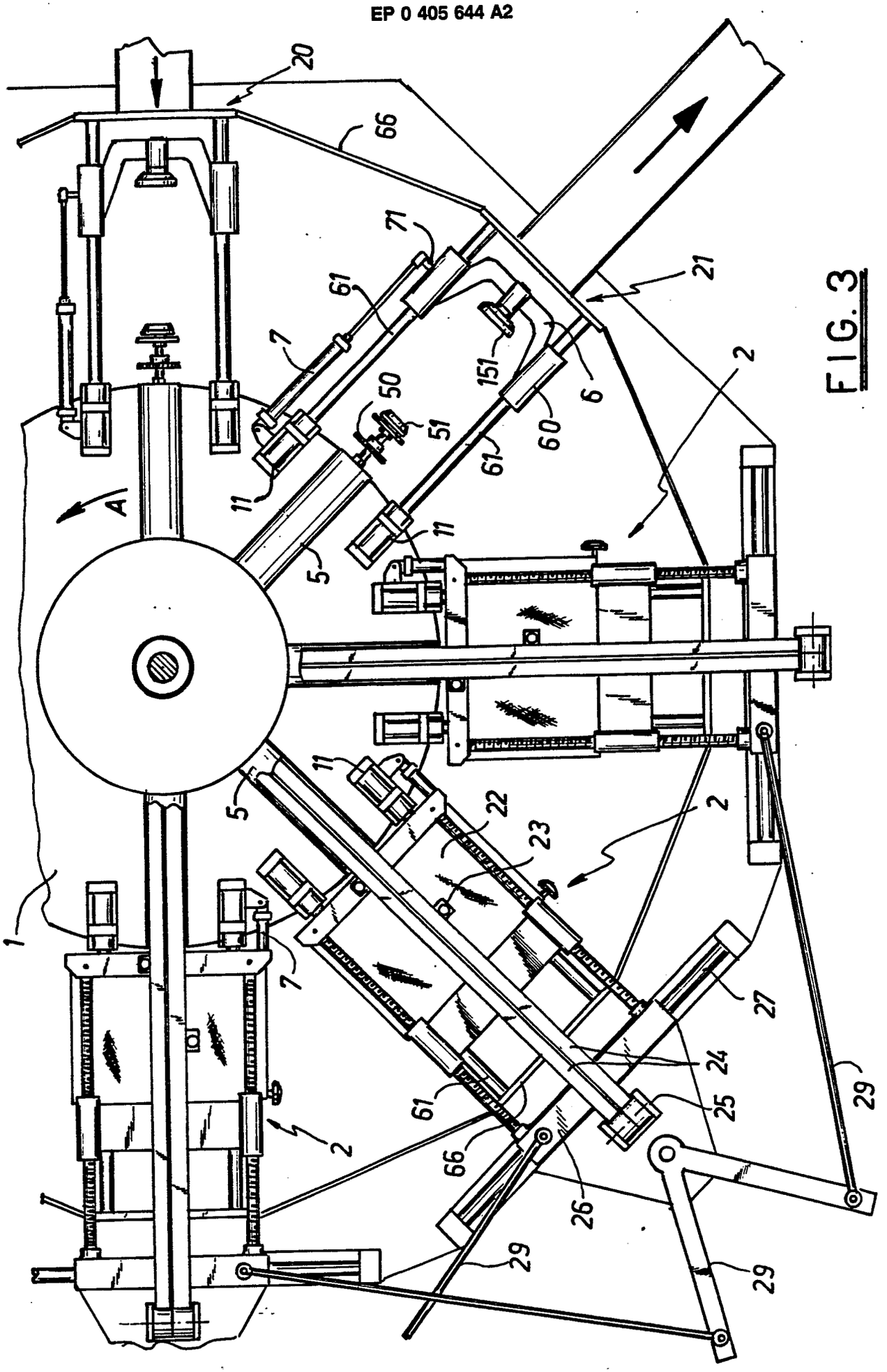

FIG. 3

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EUROPEAN SEARCH REPORT

Application Number

EP 90 20 1461

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	US-A-4 637 823 (DACH) * Column 2, line 50 - column 4, line 57 * ---	1	C 10 J 3/74 C 10 J 3/48
Y		2-4	
Y	US-A-4 525 176 (KOOG) * Column 1, lines 35-50; column 4, lines 17-43 * ---	2-4	
A	GB-A-2 073 386 (AVCO EVERETT RES.) * Page 2, line 72 - page 3, line 30; page 4, lines 48-90 * ---	1-4	
A	US-A-4 343 626 (PEISE) * Column 6, lines 16-41 * ---	1	
A	DE-A-3 219 190 (RUHR KOHLE) * Page 3; page 8, lines 5-16 * -----	1-4	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5) C 10 J

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	27-09-1990	WENDLING J.P.

CATEGORY OF CITED DOCUMENTS

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