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## EUROPEAN PATENT SPECIFICATION

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⑤4 **Process and apparatus for the production of light alloy tubing of larger diameter starting from tubing of smaller diameter.**

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⑥ References cited:  
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FR-A- 1 570 221 FR-A- 2 195 491  
GB-A- 2 007 134 GB-A- 2 025 818**

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**EP 0 432 485 B1**

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## Description

The invention concerns a process and an apparatus for the production of light alloy tubing according to the preambles of claims 1 and 3, as for example known from GB-A- 2007134.

Light alloy tubing of average outside diameter up to 250mm and thickness of 10-15mm is normally manufactured on extruding press. However the case where tubing of larger diameter up to 1000mm is needed is not rare.

Plants for manufacture of this tubing, always based on the extruding press, are few because too costly for limited production. In addition this tubing is often used at a considerable distance from the factories so that transportation costs are very high.

This situation makes necessary the installation of plants based on new processes which permit economical installations and production in any geographical area requiring larger diameter light alloy tubing.

Processes for the production of aluminium alloy rings are disclosed for example in GB-A-2007134, GB-A-2025818 and DE-A-3237295 but none of the known documents teaches a process for the production of tubes of larger diameter by simply compressing a tube of smaller diameter by a pressing roller.

## Summary of the invention

We have now found a new process and new apparatus which permit to overcome the problems of the known art.

Said apparatus comprises a mandrel (1) which is rotated by the motor (6) and a pressing roller (2) whose rotating motion is idling and which begins to rotate when between it and the mandrel (1) there is placed the tube to be processed (12) and the mandrel (1) begins to rotate.

Said process is performed by the following steps:-

- a) a light alloy tube (12) of average diameter is introduced in said mandrel (1),
- b) the mandrel (1) begins to rotate, and
- c) the tube (12) is compressed by the pressing roller (2) against the inner wall of the mandrel (1).

By this process the tube decreases in thickness and increases in diameter and length and there can be produced tubing having a diameter from 300mm to 1000mm starting from tubing having a diameter from 100mm to 400mm.

## Detailed description of the invention

The characteristics and advantages of the process and apparatus for production of light alloy

tubing of increased diameter starting from tubing of smaller diameter in accordance with the present invention are more fully explained in the following detailed description of an embodiment of the invention.

5 The equipment is illustrated in FIGS. 1, 2, 3 and 4.

FIG. 1 shows the mandrel, the pressing roller and the tube in its initial state,

10 FIG. 2 shows the mandrel, the pressing roller and the tube in the final stage,

FIG. 3 shows the complete plant, and

15 FIG. 4 shows the apparatus with the supporting structure.

With reference to the reference numbers of the various figures the apparatus consists basically of a mandrel (1) and a pressing roller (2).

20 The mandrel (1) is mounted on ball bearings and rotated by a pair of gears (4) integral with the pulley shaft (5) which is integral in turn with the motor (6) through a clutch.

25 The pressing roller (2) is mounted on large ball bearings and its motion is idling. It begins to rotate when it rests on the tube (12) to be processed and said tube rests in turn on the rotating mandrel.

The thrust of the pressing roller (2) against the tube (12) is exerted by rotating the pair of gears (7).

30 The pressing roller (2) is mounted on a misaligned axle and hence the rotation results in approach to and in withdrawal from the roller of the tube to be processed.

This arrangement makes it possible to secure high thrust on the roller with low torques at the shaft thereof.

35 Engagement and disengagement of the pressing roller (2) is provided by friction.

40 A lever system (10) with its fulcrum (11) on the supporting structure and driven by the cylinder (3) makes the pressing roller unit (2) more rigid and eliminates bending almost entirely.

The process for production of tubing in accordance with the present invention is accomplished by means of the following operations.

45 The cylinder (3) holds the lever (10) in an oblique position as shown in FIG. 4 in broken lines while in the mandrel (1) is introduced the tube (12) to be processed.

50 After introduction of the tube (12) the lever (10) is thrust by the cylinder (3) and moves to a vertical position engaging the terminal part of the shaft of the pressing roller (2). At this point the mandrel (1) is made to begin rotating and the shaft (14) of the pressing roller (2) is also made to begin operating and the misaligned rotation thereof permits approach of the pressing roller to the internal wall of the mandrel.

The thrust on the tube placed between the pressing roller (2) and the mandrel (1) results in decrease of the thickness of the tube and increase of its diameter and, even if moderately, its length. After rotation through 360 degrees of the shaft (14) of the pressing roller there is obtained the tube (13) of increased diameter.

At this point the clutch (8) is disengaged and rotation of the mandrel (1) is also stopped with disengagement of the clutch (5). When the mandrel (1) is completely stopped the cylinder (3) brings the lever (10) to the oblique position allowing extraction of the tube (13) with increased diameter.

By the described process tubing with a diameter from 100mm to 400mm and thickness from 5mm to 40mm can be processed to produce tubing having a diameter from 300mm to 1000mm and thickness from 1mm to 20mm.

### Claims

1. Process for the production of light alloy tubing wherein:
  - a light alloy tube (12) is introduced in a mandrel (1),
  - the mandrel (1) is rotated, and
  - the tube (12) is compressed by the pressing roller (2) against the inner wall of the mandrel (1), characterized in that from a tube (12) having a diameter from 100mm to 400mm and thickness from 5mm to 40mm, a tube (13) is obtained having diameter from 300mm to 1000mm and thickness from 1mm to 20mm.
2. Process in accordance with claim 1, characterized in that the tube (13) with increased diameter and decreased thickness is produced after a 360-degree rotation of the shaft (14) of the pressing roller (2).
3. Apparatus for the production of light alloy tubing of increased diameter starting from tubing of smaller diameter comprising a mandrel (1) which is rotated by the motor (6) and a pressing roller (2) whose rotating motion is idling and begins to rotate when between it and the mandrel (1) there is placed the tube (12) to be processed and the mandrel (1) begins to rotate, characterized in that a lever system (10) with its fulcrum (11) on the support structure stiffens the pressing roller (2).
4. Apparatus in accordance with claim 3, characterized in that said pressing roller (2) is mounted on a misaligned axle.

### Patentansprüche

1. Verfahren zum Herstellen von Leichtmetallrohren mit Hilfe der folgenden Verfahrensschritte:
  - ein Leichtmetallrohr (12) wird in einen Hohldorn (1) eingeführt,
  - der Hohldorn (1) wird gedreht, und
  - die Wanddicke des Rohres (12) wird durch eine Andrückrolle (2) gegen die Innенwand des Hohldornes (1) angedrückt, so daß aus einem Rohr (12) mit einem Durchmesser zwischen 100 und 400 mm und einer Wanddicke zwischen 5 und 40 mm ein Rohr (13) mit einem Durchmesser zwischen 300 und 1000 mm und einer Wanddicke zwischen 1 und 20 mm wird.
2. Verfahren nach Anspruch 1, dadurch gekennzeichnet, daß das Rohr (13) mit dem vergrößerten Durchmesser und der verminderten Wanddicke nach einer 360°-Drehung der Achse (14) der Andrückrolle (2) erzeugt wird.
3. Vorrichtung zum Herstellen von Leichtmetallrohren vergrößerten Durchmessers, ausgehend von einem Rohr mit kleinerem Durchmesser mit einem Hohldorn (1), der durch einen Motor (6) verdreht werden kann und einer Andrückrolle (2), deren Drehbewegung leerläuft und die dann umzulaufen beginnt, wenn zwischen ihr und dem Hohldorn (1) das zu bearbeitende Rohr (12) angeordnet wird und wenn der Hohldorn sich zu drehen beginnt, wobei ein Hebelsystem (10), das seinen Schwenkpunkt (11) am Maschinenbett hat, die Andrückrolle verstellt.
4. Vorrichtung nach Anspruch 3, dadurch gekennzeichnet, daß die Andrückrolle (2) auf einer exzentrischen Achse gelagert ist.

### Revendications

1. Procédé pour la production d'un tube en alliage léger, dans lequel :
  - un tube en alliage léger (12) est introduit dans un mandrin (1),
  - le mandrin (1) est mis en rotation, et
  - le tube (12) est comprimé par le cylindre comprimeur (2) contre la paroi interne du mandrin (1), caractérisé en ce que, à partir d'un tube (12) ayant un diamètre de 100 mm à 400 mm et une épaisseur de 5 mm à 40 mm, un tube (13) ayant un diamètre de 300 mm à 1000 mm et une épaisseur de 1 mm à 20 mm est obtenu.

2. Procédé selon la revendication 1, caractérisé en ce que le tube (13) ayant un diamètre supérieur et une épaisseur inférieure est produit après une rotation de 360° de l'arbre (14) du cylindre comprimeur (2). 5
3. Dispositif pour la production d'un tube en alliage léger ayant un diamètre supérieur à partir d'un tube ayant un diamètre inférieur, comprenant un mandrin (1) qui est mis en rotation par un moteur (6) et un cylindre comprimeur (2) qui peut tourner à vide et qui commence à tourner lorsque le tube à traiter (12) est placé entre lui et le mandrin (1) et le mandrin (1) commence à tourner, caractérisé en ce qu'un système de levier (10) avec un point d'appui (11) sur la structure support rigidifie le cylindre comprimeur (2). 10
4. Dispositif selon la revendication 3, caractérisé ce que ledit cylindre comprimeur (2) est monté sur un axe excentré. 15

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FIG. 1

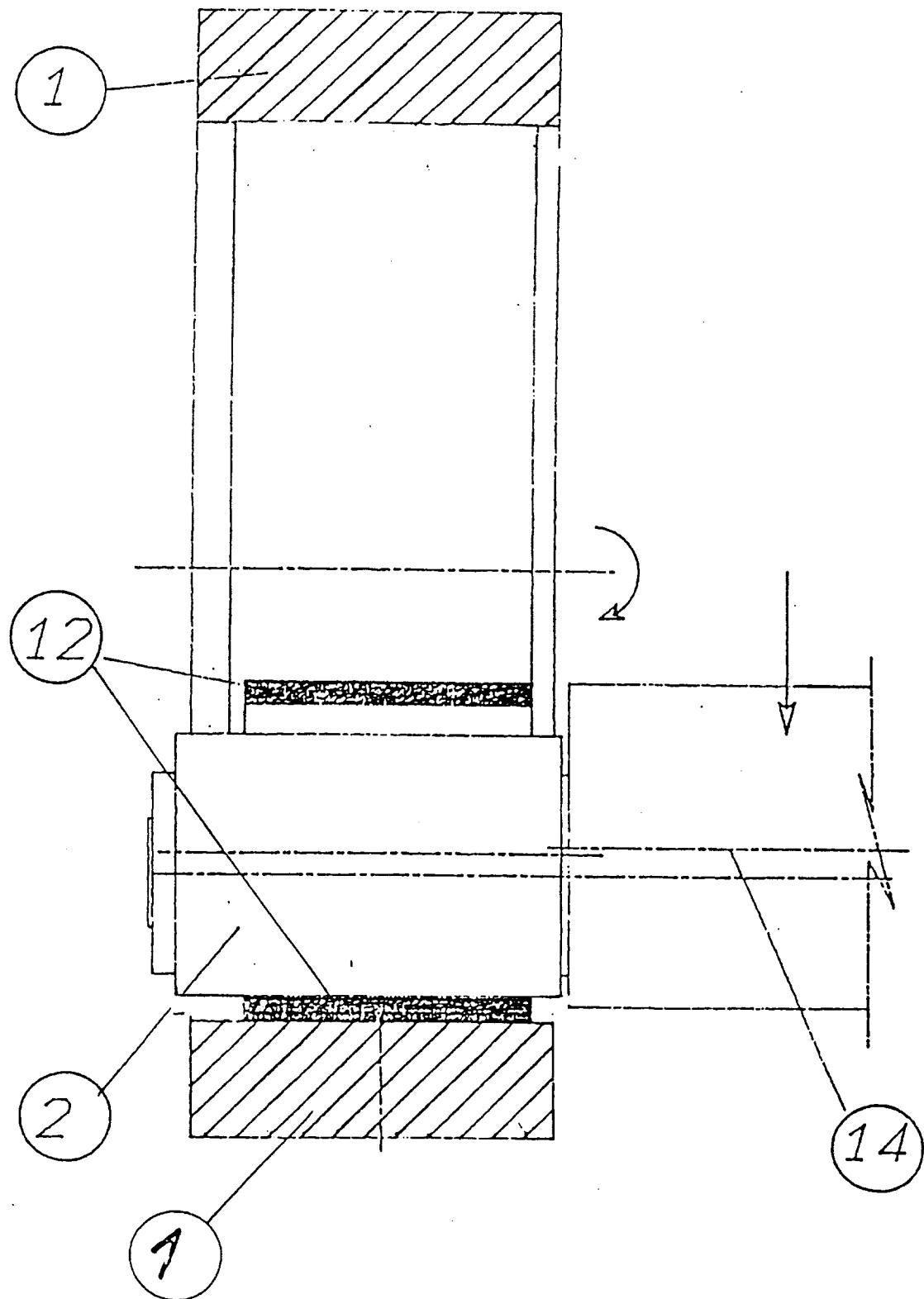


FIG. 2

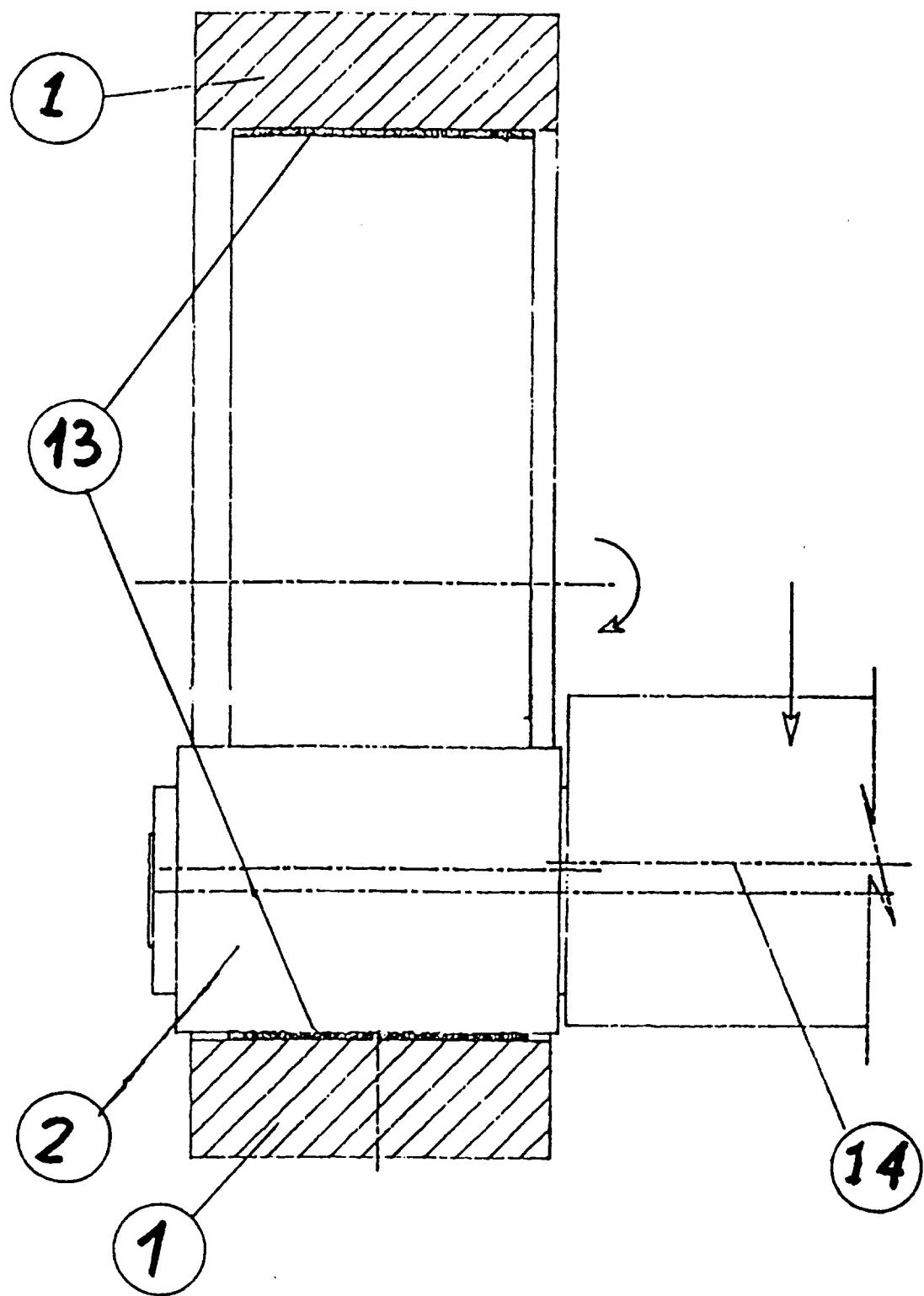


FIG. 3

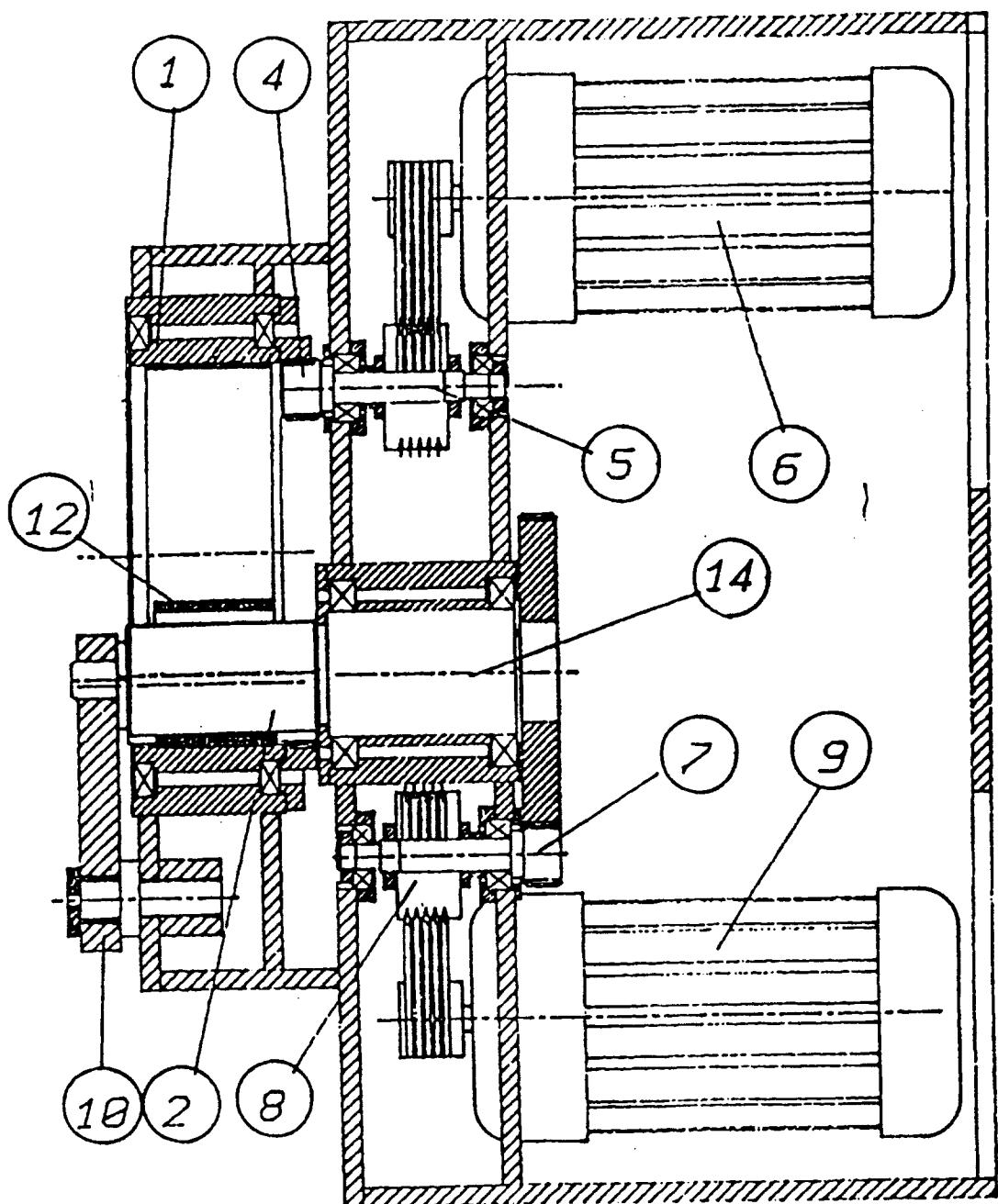


FIG. 4

