(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 0 611 028 B1

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
17.09.1997 Bulletin 1997/38

(51) Int. Cl.[6]: **B26D 7/06**, B65D 79/00, B65B 61/20

(21) Application number: **94300053.9**

(22) Date of filing: **05.01.1994**

(54) **Method and apparatus for providing pieces of flexible material from a length thereof**

Verfahren und Vorrichtung für das Besorgen von Stücken aus flexiblem Material von einem langen Stück

Procédé et appareil d'obtention de morceaux de matière flexible à partir de matière continue

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

(30) Priority: **26.01.1993 GB 9301454**

(43) Date of publication of application:
17.08.1994 Bulletin 1994/33

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EP 0 611 028 B1

Printed by Rank Xerox (UK) Business Services
2.14.14/3.4

Description

Technical Field and Background Art

The present invention relates to a method and apparatus for providing pieces of flexible material from a length thereof. The invention was primarily developed for use with plastics material such as small-bore tubing supplied as relatively long or continuous lengths, typically from supply reels, from which predetermined length pieces are cut for subsequent use. It will be appreciated however that the invention is not intended to be restricted to such use and may, with advantage, be applied to materials other than plastics tubing, for example cable or wire.

Modern production techniques frequently call for a high rate of throughput for articles and commodities. This is particularly so for beverage packages such as cans or other containers for alcoholic or non-alcoholic beverages where a filling line may be expected to run at a rate, for example, in excess of 500 containers per minute. In our development of beverage packages there is a requirement for a piece of plastics tube of predetermined length to be supplied and form a part of each package. The tube is required to be fitted to a hollow plastics insert within an open-topped container to extend upwardly within the container so that when the container is charged with beverage containing gas in solution and sealed under pressure, subsequent opening of the container develops a pressure differential between pressure in the hollow insert and pressure in the head space of the container causing gas and/or liquid to be expelled from the insert through the upstanding tube for the development of froth in the head space.

U.S. Patent A-3,888,151 is believed to be the most relevant prior art and its disclosure forms the basis for the preamble to the characterizing clauses of the independent claims to the present invention. In particular in this prior disclosure the track part through which the length of material is fed or displaced longitudinally to the guide of the rotor for cutting by the cutter is in the form of an upstanding retaining tube which rotates with the rotor and is co-axial with the guide. The retaining tube accommodates a stock length of the material which falls under gravity through the tube to present a bottom end part length which is cut off during rotation of the rotor with the tube so that successive stock lengths of the material may have to be inserted into the tube at frequent intervals when cutting at high rates. In the production of the aforementioned packages we have determined that the most economically viable means for providing the tubes for the beverage packages is for such tubes to be cut to length from a bulk supply of the tubing so that pieces of tube of predetermined length are available on demand for automatic handling to be applied to the beverage containers. There is a need however for an apparatus for, and a method of, providing pieces of flexible material, such as plastics tubes, from a length of such material which is relatively simple and efficient in operation and which is particularly suitable for providing such pieces at relatively high rates; it is an object of the present invention to satisfy this need.

Statements of Invention and Advantages

According to the present invention there is provided apparatus for providing pieces of flexible material from a length of said material which comprises a cutting station having a rotor and means for rotating the rotor about an axis, the rotor having a guide which is rotatable therewith and is radially offset from said axis; a track part in which the material is located for longitudinal displacement of said material towards the guide; means for displacing the length of material longitudinally through said guide for a free end part length of the material to project from the guide, and a cutter relative to which the rotor is rotatable so that during rotation of the rotor and material in the guide thereof, the material engages the cutter for a piece of predetermined length to be cut from the free end of the material, and wherein following said cut the displacing means indexes the material to displace it longitudinally for a further free end part length thereof to project from the guide for cutting a further said piece CHARACTERISED IN THAT the material is derived from a continuous length of said material relative to which the rotor rotates and the track part has an end adjacent to the rotor which is substantially co-axial with the axis of the rotor and is axially spaced therefrom so that during its longitudinal displacement said material moves along the track part and on leaving said end of the track part the material is displaced radially thereof over its instant part length between the guide and the track part.

Further according to the present invention there is provided a method of providing pieces of flexible material from a length of said material which comprises displacing the length of material longitudinally along a track and through a guide in a rotor so that a free end part length of the material projects from the guide; rotating the rotor about an axis with the guide radially offset from the axis so that said free end part length of the material is displaced circumferentially and during said circumferential displacement passing the material over a cutter to cut the free end part length from the material and form a piece thereof, CHARACTERISED BY deriving the material from a source relative to which the rotor rotates and which source provides a continuous length of material and by longitudinally displacing the material to the guide from an end of the track which end is substantially co-axial with the axis of the rotor and is axially spaced from the rotor, the instant part length of the material between said track end and the guide being displaced radially relative to said axis.

By the invention it is envisaged that the flexible material will, typically, be supplied as a continuous length from a drum or reel and have its free end part length subjected to circumferential displacement by a rotor and during such displacement the material passes

over a cutter by which a piece is cut from the end of the material. By this technique such pieces can be cut successively in a simple and efficient manner and at relatively high speeds by appropriately synchronising the indexing of the material through the guide of the rotor so that each piece is of predetermined length. Furthermore it is generally recognised that high rotational speeds for a rotor are far more easily achieved, are more controllable and more reliable in comparison with reciprocating blade-type cutters which have hitherto been proposed for cutting lengths of material. The length of material is flexible to the extent that its free end can be rotated by the rotor without impairing the required characteristics of the material and the material should have adequate rigidity to permit its longitudinal displacement, for example by rollers, for indexing the material through the guide. Also, depending upon the orientation of the apparatus, the material may require sufficient rigidity for the free end part length (which is to be cut to form the piece) to support its own weight, for example in an arrangement where the strip is displaced vertically through the guide for its free end part length to project in an upstanding condition from the guide. As previously mentioned, the invention was primarily developed for use in cutting pieces from small-bore plastics tubing and, for convenience, will hereinafter be discussed in relation to such use although it is to be realised that the invention may be applied, with advantage, to other types of material lengths such as cable, wire or plastics filaments.

Although the rotor may be rotated intermittently, for high speed production it is preferred that the rotor is continuously rotatable and in either case it will be usual for a single piece of tube to be cut from the free end of a supply tubing with each rotation of the rotor.

The supply tubing may be longitudinally displaceable through a guide tube which is rotatable with the rotor and provides communication between the track part and the guide.

The cutter is preferably in the form of a cutting edge or blade with which the plastics tubing engages to be cut during rotation of the rotor. The cutting edge may be mounted so that it can be indexed to present a fresh cutting edge part to the tubing as another part becomes warn. If required the cutter can present a circular cutting edge and may be driven to rotate about its axis, continuously or intermittently, during rotation of the rotor.

Preferably retaining means is provided which engages the free end part length of the supply tubing for the tubing to be cut between the retaining means and the guide. This retaining means will generally be in the form of a gripper or jaws which initially engages the free end of the supply tubing and subsequently holds the piece that is cut from the tubing. The retaining means may form part of transfer means for engaging the free end part length of the supply tubing which projects from the guide and serves to transfer the piece that is cut from the supply tubing to a predetermined station.

The aforementioned transfer means is preferably synchronised to engage the free end part length of the supply tubing immediately prior to said tubing being cut. In a preferred arrangement the transfer means has a turret rotatable about an axis remote from the rotor axis and by which the previously mentioned retaining means is displaced about a circle part of the circumference of which extends through a region that substantially coincides with part of the circumference of the circle through which the supply tubing is displaced by the rotor and in which region the rotor and cutter are arranged to cut the tubing. The retaining means is synchronised so that during rotation of the turret it engages the supply tubing as the retaining means enters the region and carries the cut piece of tube from the region to transfer it to the predetermined station. Generally the turret axis will be substantially parallel with the rotor axis. To facilitate high speed handling of the tube pieces, the turret may have a plurality of retaining means such as jaws or grippers disposed in a circumferentially spaced array and a plurality of cutting stations may be spaced circumferentially about the turret so that tube pieces emanating from the respective cutting stations are carried by retaining means selected to be synchronised with those respective cutting stations.

To facilitate automatic mechanical handling of a piece cut from the supply tubing, piece locating means can be provided by which a piece transferred to the aforementioned predetermined station by the transfer means may, for example, be engaged with a component of which the tube piece is to form part. The locating means may be arranged to displace the tube piece from the predetermined station to attach that piece with or locate that piece on or in a particular component. For example the tube piece (or other piece if not of tubular form) may be positioned and held by the locating means to the component to be secured by adhesion or welding. In a preferred arrangement, however, in which the tube pieces are fitted to hollow inserts for developing froth in beverage packages of the kind previously discussed, the tube piece may be handled by the locating means to engage as a press-fitting with a seating of the component insert - for example a free end of the tube piece may be press-fitted into a socketed port in the insert or onto a tubular spigot of the insert. The locating means may have retaining means (or further retaining means where transfer means including retaining means is provided) for engaging the tube piece at the predetermined station of the transfer means and carrying that piece into its engagement with, or location on or in the particular component. The retaining means of the locating means will usually comprise a gripper or jaws by which the tube piece is held. Where the transfer means includes retaining means such as a gripper or jaws, the further retaining means of the locating means is preferably synchronised to engage the tube piece that is transferred to the predetermined station by the transfer means prior to the retaining means of the transfer means releasing that particular tube piece. Where the transfer means comprises a rotatable turret as previ-

ously mentioned, it is preferred that the locating means comprises a second turret rotatable about an axis remote from (and usually parallel with) the axis of the turret of the transfer means. By this arrangement the retaining means of the locating means may be displaced about a circle, part of the circumference of which extends through a further region which substantially coincides with the predetermined station of the transfer means and in which further region the further retaining means of the second turret is synchronised to engage a tube piece carried by the retaining means of the transfer means prior to the retaining means of the transfer means releasing that particular tube piece to the further retaining means of the locating means to carry the tube piece during rotation of the second turret to a fitting station at which the piece is engaged with or positioned on or in a particular component such as the previously mentioned package insert. The second turret will usually have a plurality of the, or the further, retaining means such as grippers or jaws disposed in a circumferentially spaced array and which retaining means are arranged to sequentially engage successive tube pieces located at the predetermined station of the transfer means to carry those tube pieces successively to the fitting station. The locating means conveniently has seating means displaceable therewith and which seating means are intended to locate and carry components to which tube pieces carried by the retaining means of the locating means are to be applied. With this in mind the aforementioned turret of the locating means may have a circumferentially spaced array of seats associated one with each of the retaining means of that turret so that a component located by a said seat can have applied thereto the tube piece carried by the retaining means associated with that seat. For example, each seat may be intended to locate and carry an open-topped container within which is located an insert to which the tube piece is to be press-fitted through the open top of the container by displacement of the retaining means. Desirably the open-topped container will be substantially cylindrical and have a seating to which the tube piece is to be press-fitted located substantially on the axis of and within the container and the locating means may comprise a probe which is displaceable into the open top of the container and carry the tube piece for an end of that piece to be displaced axially relative to the container and press-fitted into engagement with the seating. Such an arrangement is advantageous since cylindrical containers may be positioned on the seats to accurately locate the axes of those containers with respect to the intended line of displacement of the respective probes to ensure that the free end of a tube piece will be displaced axially of the container to engage with the seating (thereby alleviating the necessity of rotationally orientating a container relative to its seat or possibly rotationally orientating the position of an insert having the seating within the container to ensure that the displacement of the free end of the tube piece will be in appropriate alignment to engage with the seating).

Drawings

One embodiment of the present invention as applied to apparatus for providing tube pieces from a length of tubing and fitting said pieces as part of beverage packages will now be described, by way of example only, with reference to the accompanying illustrative drawings in which:-

Figure 1 is a side elevation of the apparatus in section;
Figure 2 is an end elevation of a cutting station in the apparatus of Figure 1, and
Figure 3 is a schematic plan view of the apparatus.

Detailed Description of Drawings

The apparatus illustrated is intended for cutting a piece of flexible plastics tubing, typically having an inside diameter of 1 millimetre and an outside diameter of 2 millimetres, from what may be regarded as a continuous length of such tubing supplied from a reel or drum and fitting the tube piece that is formed within an open topped container prior to the container moving along a filling line to be charged with beverage and sealed to form a beverage package. The apparatus comprises a cutting station 1, a tube piece transfer unit 2 and a tube piece locating unit 3.

The cutting station 1 is intended to cut tube pieces 30 of predetermined length from plastics tubing 4 supplied from a drum or reel 5. The cutting station has a rotor 6 which is rotatable about a vertical axis 7 by a drive unit 8. The rotor 6 carries a guide port 9 spaced radially from its axis 7. Tubing 4 from the supply reel 5 is fed to and through the guide port 9 by way of a track 10 between indexing rollers shown generally at 11. An end 10A of the track 10 from which the tubing 4 emerges is located substantially on the axis 7 and a guide tube 12 extends between said end of the track 10 and the guide port 9. The guide tube 12 rotates with the rotor 6 about the axis 7 and the tubing 4 extends through the guide tube to the guide port 9 and the tube 12 provides a convenient track by which the tubing is supported and displaced radially progressively from the axis 7 to the guide port. The rollers 11 displace the tubing 4 longitudinally of its length and through the guide port 9 so that a free end part 4' of the tubing projects from the guide port of the rotor 6 in an upstanding condition as shown in Figure 2.

Located above and adjacent to the plane of rotation of the rotor 6 is a cutting blade 15 carried by a mounting 16. The blade 15 projects into the circular path subscribed by the tubing 4 as that tubing is rotated with the rotor 6, as a consequence the end part 4' of the tubing is cut off to form a tube piece 30 as the tubing engages the blade 15. The rollers 11 are indexed by a drive unit 11A to displace the tubing 4 intermittently and through predetermined lengths so that successive free end part lengths 4' of the tubing are presented to the cutter 15 for

a tube piece 30 of predetermined length to be cut on each rotation of the rotor 6 as the latter is rotated continuously. The cutter 15 may be a fixed blade or a circular blade that is rotated continuously or intermittently on its mounting 16.

The transfer unit 2 has a turret 20 which is continuously rotated by a drive unit (not shown) about a vertical axis 21 spaced from the axis 7. Carried on the turret 20 at a position spaced radially from its axis 21 is a tube piece retaining unit 22 having radially outwardly presented opposed jaws 23 which are openable and closable by a control unit 24 (such as a fluid pressure operated piston and cylinder device, an electrical solenoid or otherwise) on the turret 20. The jaws 23 are carried by the turret to subscribe a circle, part of the circumference of which coincides with a region 2A of the circle subscribed by the rotor port 9 in which region the tubing 4 engages the blade 15. In Figure 3 the rotor 6 is rotated about its axis 7 in a clockwise direction (as indicated by the arrow 26) to cut the tubing while the turret 20 is rotated about its axis 21 in a counterclockwise direction (as indicated by the arrow 27).

The cutting station 1 and transfer unit 2 are synchronised so that as the free end 4' of the tubing enters the aforementioned region 2A and approaches the cutting blade 15, the jaws 23, in an open condition, of the retaining unit 22 are carried by the rotating turret to approach and straddle the tube end 4' where the jaws 23 close and grip the tube end 4' immediately before that tube end engages the cutter 15. This gripping action of the jaws 23 conveniently stablises the tubing 4 as it is cut at a position between the guide port 9 and the jaws 23. Following cutting of the tubing 4, the cut piece 30 of the tube is retained in the closed jaws 23 and carried by the rotating turret 20 to a transfer station 31.

To facilitate supply of tube pieces 30 by the transfer unit 2 to the transfer station 31 at a high frequency, the transfer unit 2 has associated therewith four of the aforementioned cutting stations which are spaced circumferentially about the turret 20 as indicated at 1, 1A, 1B and 1C in Figure 3. Each of the four cutting stations is constructed and operated in a similar manner and supply tubing 4 for the stations 1A, 1B and 1C is derived from reels 5A, 5B, and 5C respectively. In addition the turret 20 carries twenty of the retaining units 22 which are circumferentially spaced on the turret and each is constructed and operates in a similar manner to that previously discussed. The four cutting stations are synchronised with rotation of the twenty retaining units 22 so that during rotation of the turret 20 each cutting station provides a tube piece 30 to the jaws 23 of every fifth transfer unit 24 in the circumferential array for sequential delivery to the transfer station 31.

The locating unit 3 is intended for the purpose of assembling tube pieces 30 provided at the transfer station 31 with open topped containers 40 in a beverage packaging line. The containers are in the form of light metal alloy cans having a substantially cylindrical wall 41 forming the open top 42. Fitted within the bottom of each container 40 is a hollow insert 43. The insert 43 is intended to promote froth development on opening a package formed when the container is charged with beverage containing gas in solution and sealed. When such a sealed package is opened, gas and/or liquid is intended to be injected from the hollow insert 43 into the beverage in the container to liberate gas from solution and effect the aforementioned froth development - such inserts are well known in the art as, for example, discussed in our European Patent Specification A-0 227 213. The insert 43 is provided with a seating 44 that is located on the axis of the cylindrical container and directed towards the open top 42. A tube piece 30 is to be fitted to the seating 44 for the purpose of controlling the aforementioned froth development as previously discussed in the preamble hereto. The containers 40 with the fitted inserts 43 and in an upstanding condition are fed successively by a conveyor 50 and star wheel 51 (rotating anti-clockwise in Figure 3) to be accommodated in a seat 52 carried by a horizontal platform 53 of the locating unit 3. The platform 53 is rotated by a drive unit (not shown) about a vertical axis 54 spaced from the axes 7 and 21 and in a clockwise direction as indicated by the arrow 55 in Figure 3. Twenty seats 52 are provided on the platform 53 spaced circumferentially about the axis 54. Located above the platform 53 is a turret 56 which rotates about the axis 54 in unison with the seats 52. The turret 56 carries twenty tube fitting heads 60 which are spaced circumferentially about the axis 54 and positioned one each vertically above the seats 52. The heads 60 are mounted on the lower ends of vertical rods 61 having rolling cam followers 62 which engage in a cam track 63 on a cylindrical stationary core 64 of the locating unit. During rotation of the turret 56 and seats 52 the cam followers 62 follow the cam track 63 to impart vertical displacement to the rods 61 and thereby to the heads 60 so that for each rotation of the turret 56 the heads 60 exhibit a predetermined cycle of vertical displacement.

Each head 60 has a vertical probe 70 at the bottom end of which is carried a set of radially outwardly directed opposed jaws 71 which are openable and closable by a control unit 72 on the head (in a similar manner to the control unit 24 on the retaining unit 22). During rotation of the turret 56 the jaws 71 of the heads 60 are displaced along a common circle concentric with the axis 54 and which circle coincides with the transfer station 31 of the transfer unit 2. The rotation of the turret 56, vertical displacement of the head 60 and actuation of the jaws 71 is synchronised with the transfer of a tube piece 30 by the transfer unit 2 to the station 31 so that the jaws 71 are open and are moved by the rotating turret 56 to straddle a tube piece 30 gripped by the jaws 23 of a retaining unit 22 approaching the transfer station 31. At the transfer station 31 the jaws 71 are closed to grip the tube piece 30 and the jaws 23 of the retaining unit 22 and opened to release the tube piece 30 captured by the jaws of a head 60 as the turret 20 and turret 56 continue to rotate in counterwise directions. The

jaws 71 of a head 60 engage a tube piece 30 at the transfer station 31 at a position towards the lower end of that tube piece and with the head 60 retracted vertically (under control of the cam follower 62 and cam track 63) to provide sufficient clearance for a container 40 to be accommodated in the seat 52 beneath the head 60 and the lower end of the tube piece 30 carried thereby.

A container 40 is transferred by the star wheel 51 to be accommodated on a seat 52 so that the axis of the container and the seating 44 of its insert 43 are in vertical axial alignment with the bottom end 30A of a tube piece 30 carried by the head 60 associated with that particular seat. During unified rotation of the turret 56 and seats 52, a tube piece 30 carried by a head 60 from the transfer station 31 is displaced vertically downwardly under control of the cam follower 62 and track 63 so that the probe 70 of that head enters the open top 42 of the container which underlies that head to displace the bottom end 30A of the tube piece along the axis of the container. Continued rotation of the turret 56 and vertical displacement of the head downwardly causes the bottom end 30A of the tube to be press fitted into engagement with the seating 44 of the insert 43 as shown at the righthand side of the locating unit 3 in Figure 1. The seating 44 of the insert may be in the form of a socket into which the bottom end 30A of the tube piece is fitted or may be in the form of a spigot on which the bottom end 30A of the tube piece is received. Following fitting of the tube piece 30 to the seating 44 and during continued rotation of the turret 56 and seat 52, the jaws 71 are opened to release the tube piece 30 (which is retained within the container 40) and the head 60 retracts vertically from the container as the head approaches the transfer station 31 in readiness to receive a further tube piece 30 from the transfer unit 2. By locating the seating 44 on the axis of the cylindrical container 40 and displacing the bottom end 30A of the tube piece along that axis into engagement with the insert, it will be appreciated that there is no necessity to provide any particular rotational orientation between the insert 43 and the container 40 or between the container 40 and the seat 52. Following fitting of the tube piece 30 to the insert and withdrawal of the probe 70 from the container, the container is displaced from its seat 52 by a star wheel 80 back onto the conveyor 50 by which it may be transferred successively to a beverage filling station and container sealing station.

The transfer unit 2 and heads 60 of the locating unit 3 are synchronised so that tube pieces 30 are fitted successively to the open topped containers as they are fed into the seats 52 of the platform 53. For convenience of description a container 40 has been shown in Figure 3 located in the seat 52 which underlies a head 60 at the transfer station 31. However, in practice of the illustrated embodiment, and as will be appreciated from Figure 3, a seat 52 will receive an open topped container only when the jaws 71 of the head 60 which overlies that seat have already picked up a tube piece 30 from the transfer station 3 and also a container fitted with the tube 30 will be removed from its seat 52 by the star wheel 80 before that container reaches the transfer station 31; consequently a container will not be located in a seat 52 at the time when the head 60 associated with that particular seat passes through the transfer station 31 to pick up a tube piece 30.

Claims

1. Apparatus for providing pieces (30) of flexible material from a length (4) of said material which comprises a cutting station (1) having a rotor (6) and means (8) for rotating the rotor about an axis (7), the rotor having a guide (9) which is rotatable therewith and is radially offset from said axis (7); a track part (10) in which the material (4) is located for longitudinal displacement of said material towards the guide (9); means (11) for displacing the length (4) of material longitudinally through said guide (9) for a free end part length (4') of the material to project from the guide, and a cutter (15) relative to which the rotor (6) is rotatable so that during rotation of the rotor and material (4') in the guide thereof, the material engages the cutter (15) for a piece (30) of predetermined length to be cut from the free end (4') of the material, and wherein following said cut the displacing means (11) indexes the material (4) to displace it longitudinally for a further free end part length (4') thereof to project from the guide (9) for cutting a further said piece (30) CHARACTERISED IN THAT the material (4) is derived from a continuous length (5) of said material relative to which the rotor (6) rotates and the track part (10) has an end (10A) adjacent to the rotor (6) which is substantially co-axial with the axis (7) of the rotor and is axially spaced therefrom so that during its longitudinal displacement said material (4) moves along the track part (10) and on leaving said end (10A) of the track part the material (4) is displaced radially thereof over its instant part length between the guide (9) and the track part (10).

2. Apparatus as claimed in Claim 1 in which the rotor (6) is continuously rotatable.

3. Apparatus as claimed in either Claim 1 or Claim 2 in which for each rotation of the rotor (6) a single said piece (30) of flexible material is cut from the strip.

4. Apparatus as claimed in any one of the preceding claims in which the material (4) is longitudinally displaceable through a guide tube (12) which is rotatable with the rotor (6) and provides communication between said end (10A) of the track part (10) and the guide (9).

5. Apparatus as claimed in any one of the preceding Claims in which the cutter (15) comprises a cutting edge with which the strip (4') engages to be cut dur-

ing rotation of the rotor (6).

6. Apparatus as claimed in Claim 5 in which the cutting edge is substantially circular and is mounted to be rotatable about its axis.

7. Apparatus as claimed in Claim 6 and comprising means for rotating the cutter during rotation of the rotor.

8. Apparatus as claimed in any one of the preceding Claims in which the means (11) for displacing the length of material (4) longitudinally comprises roller means rotation of which effects said displacement and which roller means (11) is synchronised with the rotor (6) to index said material in its longitudinal displacement for cutting.

9. Apparatus as claimed in any one of the preceding Claims in which the length of material (4) is fed to the rotor (6) from a supply reel (5).

10. Apparatus as claimed in any one of the preceding Claims and comprising transfer means (2) for transferring the piece cut (30) from said material (4) to a predetermined station (31).

11. Apparatus as claimed in Claim 10 in which the transfer means (2) comprises retaining means (22) which engages the free end part length (4') of the material for said material to be cut between the retaining means (22) and the guide (9) and wherein said retaining means (22) carries the resultant piece (30) cut from the material to the predetermined station (3).

12. Apparatus as claimed in Claim 11 in which the retaining means (22) comprises a gripper or jaws (23) by which the material (4') is held.

13. Apparatus as claimed in either Claim 11 or Claim 12 in which the retaining means (22) is synchronised to engage said free end part length (4') of the material immediately prior to said material being cut.

14. Apparatus as claimed in any one of Claims 11 to 13 in which the transfer means (2) comprises a turret (20) rotatable about an axis (21) remote from the rotor axis (7) and by which said retaining means (22) is displaced about a circle, part of the circumference of which circle extends through a region which substantially coincides with part of a circumference of the circle through which the material (4') is displaced by the rotor (6) and wherein the rotor (6) and cutter (15) are arranged to cut the material (4') in said region and said retaining means (22) is synchronised so that during rotation of the turret (20) the retaining means (22) engages the material (4') as the retaining means (22) enters said region and carries the piece (30) from said region to transfer it to said predetermined station (3).

15. Apparatus as claimed in Claim 14 in which the turret axis (21) is substantially parallel with the rotor axis (7).

16. Apparatus as claimed in either Claim 14 or Claim 15 in which the turret (20) has a plurality of said retaining means (22) disposed in a circumferentially spaced array and wherein a plurality of said cutting stations (1) are circumferentially spaced about the turret (20) for pieces (30) emanating from each said cutting station (1) to be transferred to at least one said retaining means (22) in the array selected to be synchronised with that said cutting station (1).

17. Apparatus as claimed in any one of Claims 10 to 16 and comprising piece locating means (3) by which a piece (30) transferred to said predetermined station (31) is applied to a component (43) with which said piece (30) is to form an assembly.

18. Apparatus as claimed in Claim 17 in which the locating means (3) is arranged to displace the piece from said predetermined station (21) to press-fit that piece (20) into engagement with said component (43).

19. Apparatus as claimed in either Claim 17 or Claim 18 in which the locating means (3) comprises retaining means or further retaining means (31) for engaging the piece (30) at said predetermined station (31) and carrying that piece (30) into its assembly with said component (43).

20. Apparatus as claimed in Claim 19 in which the retaining means of the locating means (3) comprises a gripper or jaws (71) by which the piece (30) is held.

21. Apparatus as claimed in either Claim 19 or Claim 20 when appendant to Claim 11 in which the further retaining means (71) of the locating means (3) is synchronised to engage the piece (30) transferred to the predetermined station (31) by the transfer means (2) prior to the retaining means (23) of the transfer means (2) releasing the said piece (30).

22. Apparatus as claimed in Claim 21 when appendant to Claim 14 in which the locating means (3) comprises a second turret (56) rotatable about an axis (54) remote from the axis (21) of said turret (20) of the transfer means (2) and by which second turret (56) the further retaining means (71) of the locating means (3) is displaced about a circle, part of the circumference of which circle extends through a further region which substantially coincides with said

predetermined station (31) and in which further region the further retaining means (71) of the second turret (56) is synchronised to engage a piece (30) carried by the retaining means (23) of the transfer means (2) prior to the retaining means (23) of the transfer means (2) releasing the said piece (30) for the further retaining means (71) to carry that piece (30) during rotation of the second turret (56) to a fitting station at which the piece (30) is assembled with said component (43).

23. Apparatus as claimed in Claim 22 in which the axis (54) of the second turret (56) is substantially parallel with the axis (21) of the turret (20) of the transfer means (2).

24. Apparatus as claimed in either Claim 22 or Claim 23 in which the second turret (56) has a plurality of said further retaining means (71) disposed in a circumferentially spaced array and which further retaining means (71) sequentially engage successive pieces (30) located at the predetermined station (31) to carry said pieces (30) successively to the fitting station.

25. Apparatus as claimed in any one of Claim 22 to 24 in which said second turret (56) has seating means (52) rotatable therewith and which seating means (52) is intended to locate and carry a said component (43) for assembly therewith of a said piece (30) carried by the further retaining means (71).

26. Apparatus as claimed in Claim 25 when appendant to Claim 24 in which the second turret (56) has a circumferentially spaced array of seats (52) associated one with each of said further retaining means (71) so that a component (43) located and carried on a said seat (52) can have assembled therewith a piece (30) carried by the further retaining means (71) associated with that said seat (52).

27. Apparatus as claimed in any one of Claims 22 to 26 wherein the further retaining means (71) is displaceably mounted on the second turret (56) and controlled so that during rotation of that turret (56) the further retaining means (71) and a piece (30) carried thereby is displaced successively for the piece (30) to be assembled with the component (43) at said fitting station, the further retaining means (71) to release the piece (30) to the component (43) and the further retaining means (71) to withdraw from the assembly of the component (43) and said piece (30) in preparation for the further retaining means (71) to engage a further piece (30) at the predetermined station (31).

28. Apparatus as claimed in Claim 27 in which displacement of the further retaining means (71) on the second turret (56) is determined by relative displacement between cam track means (63) and cooperating cam follower means (62) effected during rotation of the second turret (56).

29. Apparatus as claimed in any one of Claims 17 to 28 in which the piece locating means (3) comprises a seat (52) for receiving an open-topped substantially cylindrical container (40) which container has a seating (44) located substantially on the axis thereof and with which seating (44) a free end (30A) of the piece (30) is to engage, and wherein the locating means (3) comprises a head (60) which carries said piece (30) for an end (30A) thereof to be displaced along the axis of a container (40) in said seat (52) for said end (30A) of the piece to be fitted into engagement with said seating (44) in the container.

30. Apparatus as claimed in any one of the preceding Claims in which the material comprises plastics tubing.

31. A method of providing pieces (30) of flexible material from a length (4) of said material which comprises displacing the length of material longitudinally along a track (10) and through a guide (9) in a rotor (6) so that a free end part length (4') of the material projects from the guide (9); rotating the rotor (6) about an axis (7) with the guide (9) radially offset from the axis (7) so that said free end part length (4') of the material is displaced circumferentially and during said circumferential displacement passing the material (4') over a cutter (15) to cut the free end part length (4') from the material and form a piece (30) thereof, CHARACTERISED BY deriving the material (4) from a source (5) relative to which the rotor (6) rotates and which source (5) provides a continuous length of material and by longitudinally displacing the material to the guide (9) from an end (10A) of the track (10) which end is substantially co-axial with the axis (7) of the rotor (6) and is axially spaced from the rotor (6), the instant part length of the material (4) between said track end (10A) and the guide (9) being displaced radially relative to said axis (7).

32. A method as claimed in Claim 31 in which the material (4) is plastics tubing.

33. A method as claimed in either Claim 31 or Claim 32 which comprises continuously rotating the rotor (6) and indexing the length of material (6) to displace it longitudinally to cut said pieces (30) successively from the material (4) during rotation of the rotor (6).

34. A method as claimed in any one of Claim 31 to 33 which comprises engaging the free end part length (4') of the material prior to cutting that free end part length (4') from the material to retain said piece (30)

and displacing the piece (30) so retained for assembly thereof with a component (43).

35. A method as claimed in Claim 34 which comprises displacing the piece (30) for a free end (30A) thereof to engage with the component (43).

36. A method as claimed in Claim 35 in which the component (43) comprises an open-topped container (40) having a seating (44) therein and which comprises displacing said piece (30) into the container through the open top (42) for said free end (30A) of the piece to engage with the seating (44).

37. A method as claimed in Claim 36 in which the container (40) is substantially cylindrical and said seating (44) is located substantially on the axis of the container and which comprises displacing said free end (30A) of the piece substantially along the axis of the container into engagement with the seating (44).

38. A method as claimed in any one of Claims 31 to 37 which comprises retaining the free end part length (4') of the material in a gripper or jaws (23) prior to said material being cut by the cutter (15) and displacing said piece (30) in the gripper or jaws (23) to a predetermined station (31).

39. A method as claimed in Claim 38 when appendant to Claim 36 which comprises engaging said piece (30) at the predetermined station (31) and displacing the piece (30) therefrom into engagement with said seating (44).

Patentansprüche

1. Vorrichtung für die Bereitstellung von Stücken (30) aus flexiblem Material aus einer Länge (4) des Materials, welche aus einer Schneidstation (1) mit einem Rotor (6) und einer Einrichtung (8) zur Drehung des Rotors um eine Achse (7) besteht, wobei der Rotor eine Führung (9) aufweist, die mit diesem drehbar und zu seiner Achse (7) radial versetzt ist; einem Spurenteil (10), in welchem das Material (4) für eine Verschiebung in Längsrichtung des Materials gegen die Führung (9) angeordnet ist; einer Einrichtung (11) zum Verschieben der Länge (4) des Materials in der Längsrichtung durch diese Führung (9) hindurch, damit eine freie Endteillänge (4') des Materials von der Führung vorsteht, sowie einem Schneider (15), relativ zu welchem der Rotor (6) drehbar ist, sodaß während der Drehung des Rotors und des Materials (4') in dessen Führung das Material mit dem Schneider (15) in Eingriff kommt, damit ein Stück (30) einer vorbestimmten Länge, von dem freien Ende (4') des Materials abgeschnitten wird, und bei welcher im Anschluß an diesen Schnitt die Verschiebeeinrichtung (11) das Material (4) indexiert, um es in Längsrichtung über eine weitere freie Endteillänge (4') zu verschieben, damit es von der Führung (9) für den Zuschnitt eines weiteren Stückes (30) vorsteht, dadurch gekennzeichnet, daß das Material (4) von einer kontinuierlichen Länge (5) des Materials abgeleitet ist, relativ zu welchem der Rotor (6) dreht, und der Spurenteil (10) ein Ende (10A) neben dem Rotor (6) aufweist, welches im wesentlichen koaxial zu der Achse (7) des Rotors und davon axial beabstandet ist, sodaß sich das Material (4) während seiner Verschiebung in Längsrichtung entlang des Spurenteils (10) bewegt und das Material (4) beim Verlassen des Endes (10A) des Spurenteils radial dazu über seine augenblickliche Teillänge zwischen der Führung (9) und dem Spurenteil (10) verschoben wird.

2. Vorrichtung nach Anspruch 1, bei welcher der Rotor (6) kontinuierlich drehbar ist.

3. Vorrichtung nach Anspruch 1 oder Anspruch 2, bei welcher bei jeder Drehung des Rotors (6) ein einziges Stück (30) des flexiblen Materials von dem Streifen abgeschnitten wird.

4. Vorrichtung nach einem der vorhergehenden Ansprüche, bei welchem das Material (4) durch ein Führungsrohr (12) hindurch in Längsrichtung verschiebbar ist, welches mit dem Rotor (6) drehbar ist und eine Verbindung zwischen dem Ende (10A) des Spurenteils (10) und der Führung (9) bereitstellt.

5. Vorrichtung nach einem der vorhergehenden Ansprüche, bei welcher der Schneider (15) eine Schneidkante aufweist, mit welcher der Streifen (4') für den Schnitt während der Drehung des Rotors (6) in Wirkverbindung kommt.

6. Vorrichtung nach Anspruch 5, bei welcher die Schneidkante im wesentlichen kreisförmig ist und für eine Drehung um ihre Achse angeordnet ist.

7. Vorrichtung nach Anspruch 5, welche eine Einrichtung zur Drehung des Schneiders während der Drehung des Rotors aufweist.

8. Vorrichtung nach einem der vorhergehenden Ansprüche, bei welcher die Einrichtung (11) zum Verschieben der Länge des Materials (4) in Längsrichtung eine Rolleneinrichtung aufweist, deren Drehung die Verschiebung bewirkt, wobei die Rolleneinrichtung (11) mit dem Rotor (6) synchronisiert ist, um das Material bei seiner Verschiebung in Langsrichtung für den Schnitt zu indexieren.

9. Vorrichtung nach einem der vorhergehenden Ansprüche, bei welcher die Materiallänge (4) zu

dem Rotor (6) von einer Vorratspule (5) zugeführt wird.

10. Vorrichtung nach einem der vorhergehenden Ansprüche, welche eine Transfereinrichtung (2) für eine Überführung des von dem Material (4) abgeschnittenen Stückes (30) zu einer vorbestimmten Station (31) aufweist.

11. Vorrichtung nach Anspruch 10, bei welcher die Transfereinrichtung (2) eine Halteeinrichtung (22) aufweist, welche mit der freien Endteillänge (4') des Materials in Eingriff kommt, damit das Material zwischen der Halteeinrichtung (22) und der Führung (9) geschnitten wird, und bei welcher die Halteeinrichtung (22) das von dem Material erhaltene, abgeschnittene Stück (10) zu der vorbestimmten Station (3) trägt.

12. Vorrichtung nach Anspruch 11, bei welcher die Halteeinrichtung (22) einen Greifer oder Klauen (23) aufweist, durch welche das Material (4') gehalten wird.

13. Vorrichtung nach Anspruch 11 oder Anspruch 12, bei welcher die Halteeinrichtung (22) für einen Eingriff mit der freien Endteillänge (4') des Materials unmittelbar vor dem Schneiden des Materials synchronisiert ist.

14. Vorrichtung nach einem der Ansprüche 11 bis 13, bei welcher die Transfereinrichtung (2) einen Revolverkopf (20) aufweist, der um eine Achse (21) fern von der Rotorachse (7) drehbar ist und durch welchen die Halteinrichtung (22) entlang eines Kreises verschiebbar ist, von dem ein Teil des Umfangs durch einen Bereich hindurch verläuft, der im wesentlichen mit einem Teil des Umfangs des Kreises übereinstimmt, entlang von welchem das Material (4') durch den Rotor (6) verschoben wird, und bei welcher der Rotor (6) und der Schneider (15) für einen Schnitt des Materials (4') in diesem Bereich angeordnet sind und die Halteeinrichtung (22) derart synchronisiert ist, daß während der Drehung des Revolverkopfes (20) die Halteeinrichtung (22) mit dem Material (4') in Eingriff kommt, sobald die Halteeinrichtung (22) in diesen Bereich eintritt und das Stück (30) von diesem Bereich trägt, um es zu der vorbestimmten Station (3) zu überführen.

15. Vorrichtung nach Anspruch 14, bei welcher die Revolverkopf-Achse (21) im wesentlichen parallel zu der Rotorachse (7) verläuft.

16. Vorrichtung nach Anspruch 14 oder Anspruch 15, bei welcher der Revolverkopf (20) eine Vielzahl von Halteinrichtungen (22) aufweist, die in einer in Umfangsrichtung voneinander beabstandeten Reihe angeordnet sind, und bei welcher eine Vielzahl der Schneidstationen (1) in Umfangsrichtung um den Revolverkopf (20) herum beabstandet sind, damit die von jeder Schneidstation (1) hervorgebrachten Stücke (30) zu wenigstens einer der Halteeinrichtungen (22) in der Reihe überführt werden, die für eine Synchronisierung mit dieser Schneidstation (1) ausgewählt wurde.

17. Vorrichtung nach einem der Ansprüche 10 bis 16, welche eine Stücklokalisierungseinrichtung (3) aufweist, durch welche ein zu der vorbestimmten Station (31) überführtes Stück (30) an eine Komponente (43) angewandt wird, mit welcher das Stück (30) eine Baugruppe bilden soll.

18. Vorrichtung nach Anspruch 17, bei welcher die Lokalisierungseinrichtung (3) angeordnet ist für eine Verschiebung des Stückes von der vorbestimmten Station (21), um dieses Stück (20) mit einem Preßsitz in einen Eingriff mit der Komponente (43) zu bringen.

19. Vorrichtung nach Anspruch 17 oder Anspruch 18, bei welcher die Lokalisierungseinrichtung (3) eine Halteeinrichtung oder eine weitere Halteeinrichtung (31) für einen Eingriff des Stückes (30) an der vorbestimmten Station (31) sowie für ein Halten dieses Stückes (30) in seiner Baugruppe mit der Komponente (43) aufweist.

20. Vorrichtung nach Anspruch 19, bei welcher die Halteeinrichtung der Lokalisierungseinrichtung (3) einen Greifer oder Klauen (71) aufweist, durch welche das Stück (30) gehalten wird.

21. Vorrichtung nach Anspruch 19 oder Anspruch 20, in der Rückbeziehung auf Anspruch 11, bei welcher die weitere Halteeinrichtung (71) der Lokalisierungseinrichtung (3) synchronisiert ist für einen Eingriff mit dem zu der vorbestimmten Station (31) durch die Transfereinrichtung (2) überführten Stück (30), bevor die Halteeinrichtung (23) der Transfereinrichtung (2) dieses Stück (30) freigibt.

22. Vorrichtung nach Anspruch 21 in der Rückbeziehung auf Anspruch 14, bei welcher die Lokalisierungseinrichtung (3) einen zweiten Revolverkopf (56) aufweist, der um eine Achse (54) fern von der Achse (21) des Revolverkopfes (20) der Transfereinrichtung (2) drehbar ist und durch welchen zweiten Revolverkopf (56) die weitere Halteeinrichtung (71) der Lokalisierungseinrichtung (3) entlang eines Kreises verschoben wird, bei dem ein Teil des Umfangs dieses Kreises durch einen weiteren Bereich hindurch verläuft, welcher im wesentlichen übereinstimmt mit der vorbestimmten Station (31) und in welchem weiteren Bereich die weitere Halteeinrichtung (71) des zweiten Revolverkopfes (56) für eine Wirkverbindung mit einem Stück (30) syn-

chronisiert ist, das durch die Halteeinrichtung (23) der Transfereinrichtung (2) getragen ist, bevor die Halteeinrichtung (23) der Transfereinrichtung (2) dieses Stück (30) freigibt für die weitere Halteeinrichtung (71), um das Stück (30) während der Drehung des zweiten Revolverkopfes (56) zu einer Zusammenbau-Station zu tragen, in welcher das Stück (30) mit der Komponente (43) zusammengebaut wird.

23. Vorrichtung nach Anspruch 2, bei welcher die Achse (54) des zweiten Revolverkopfes (56) im wesentlichen parallel zu der Achse (21) des Revolverkopfes (20) der Transfereinrichtung (2) verläuft.

24. Vorrichtung nach Anspruch 22 oder Anspruch 23, bei welcher der zweite Revolverkopf (56) eine Vielzahl der weiteren Halteeinrichtungen (71) aufweist, die in einer in Umfangsrichtung beabstandeten Reihe angeordnet sind, wobei die weiteren Halteeinrichtungen (71) aufeinanderfolgend mit aufeinanderfolgenden Stücken (30) in Wirkverbindung kommen, die an der vorbestimmten Station (31) angeordnet sind, um die Stücke (30) aufeinanderfolgend zu der Zusammenbau-Station zu tragen.

25. Vorrichtung nach einem der Ansprüche 22 bis 24, bei welcher der zweite Revolverkopf (56) eine Sitzeinrichtung (52) aufweist, die damit drehbar ist, wobei die Sitzeinrichtung (52) für eine Lokalisierung und ein Mittragen einer Komponente (43) für eine Baugruppe des Stückes (30) beabsichtigt ist, das durch die weitere Halteeinrichtung (71) getragen wird.

26. Vorrichtung nach Anspruch 25 in der Rückbeziehung auf Anspruch 24, bei welcher der zweite Revolverkopf (56) eine in Umfangsrichtung beabstandete Reihe von Sitzen (52) aufweist, von denen je einer mit einer weiteren Halteeinrichtung (71) verbunden ist, sodaß eine an einem Sitz (52) angeordnete und darauf getragene Komponente (43) ein Stück (30) damit zusammengebaut haben kann, das durch die weitere Halteeinrichtung (71) getragen wird, welche mit dem Sitz (52) verbunden ist.

27. Vorrichtung nach einem der Ansprüche 22 bis 26, bei welcher die weitere Halteeinrichtung (21) an dem zweiten Revolverkopf (56) verschiebbar angeordnet ist und derart gesteuert wird, daß während der Drehung dieses Revolverkopfes (56) die weitere Halteeinrichtung (71) und ein dadurch getragenes Stück (30) aufeinanderfolgend verschoben werden, damit dieses Stück (30) mit der Komponente (43) in der Zusammenbau-Station zusammengebaut wird, die weitere Halteeinrichtung (71) das Stück (30) an die Komponente (43) freigibt und die weitere Halteeinrichtung (71) von der Baugruppe der Komponente (43) und des Stückes (30) zurückgezogen wird für eine Vorbereitung des Eingriffs der weiteren Halteeinrichtung (71) mit einem weiteren Stück (30) an der vorbestimmten Station (31).

28. Vorrichtung nach Anspruch 27, bei welcher die Verschiebung der weiteren Halteeinrichtung (71) an dem zweiten Revolverkopf (56) durch die relative Verschiebung zwischen einer Nockenspureinrichtung (63) und einer damit zusammenwirkenden Nockenfolgereinrichtung (62) bestimmt wird, die während der Drehung des zweiten Revolverkopfes (56) bewirkt wird.

29. Vorrichtung nach einem der Ansprüche 17 bis 28, bei welchem die Stücklokalierungseinrichtung (3) einen Sitz (52) für die Aufnahme eines oben offenen, im wesentlichen zylindrischen Behälters (40) aufweist, wobei der Behälter ein Sitzteil (44) hat, das im wesentlichen in seiner Achse angeordnet ist und mit welchem Sitzteil (44) ein freies Ende (30A) des Stückes (30) zum Eingriff bestimmt ist, und wobei die Lokalisierungseinrichtung (3) einen Kopf (60) aufweist, der das Stück (30) trägt, damit ein Ende (30A) davon entlang der Achse eines Behälters (40) in dem Sitz (52) verschoben wird, um das Ende (30A) des Stückes in einen Eingriff mit dem Sitzteil (44) in dem Behälter einzupassen.

30. Vorrichtung nach einem der vorhergehenden Ansprüche, bei welchem das Material aus einer Kunststoffrohrleitung besteht.

31. Verfahren zur Bereitstellung von Stücken (30) aus flexiblem Material aus einer Länge (4) des Materials, welches aus einer Verschiebung der Länge des Materials in der Längsrichtung entlang einer Spur (10) und durch eine Führung (9) in einem Rotor (6) hindurch besteht, sodaß eine freie Endteillänge (4') des Materials von der Führung (9) vorsteht; einer Drehung des Rotors (6) um eine Achse (7), von welcher Achse (7) die Führung (9) radial versetzt ist, sodaß die freie Endteillänge (4') des Materials in Umfangsrichtung verschoben wird und das Material (4') während der Verschiebung in Umfangsrichtung über einen Schneider (15) passiert, um die freie Endteillänge (4') von dem Material abzuschneiden und davon ein Stück (30) zu bilden, dadurch gekennzeichnet, daß das Material (4) von einer Quelle (5) abgeleitet wird, relativ zu welcher sich der Rotor (6) dreht und welche Quelle (5) eine kontinuierliche Materiallänge bereitstellt, und daß das Material in Längsrichtung zu der Führung (9) von einem Ende (10A) der Spur (10) verschoben wird, wobei das Ende im wesentlichen koaxial zu der Achse (7) des Rotors (6) verläuft und von dem Rotor (6) axial beabstandet ist, wobei die augenblickliche Teillänge des Materials (4) zwischen dem Spurenende (10A) und der Führung (9) radial rela-

tiv zu dieser Achse (7) verschoben wird.

32. Verfahren nach Anspruch 31, bei welchem das Material (4) eine Kunststoff-Rohrleitung ist.

33. Verfahren nach Anspruch 31 oder Anspruch 32, bei welchem der Rotor (6) kontinuierlich gedreht und die Länge des Materials (6) indexiert wird, damit es in Längsrichtung verschoben wird, um die Stücke (30) aufeinanderfolgend von dem Material (4) während der Drehung des Rotors (6) abzuschneiden.

34. Verfahren nach einem der Ansprüche 31 bis 33, bei welchem die freie Endteillänge (4') des Materials vor dem Abschneiden der freien Endteillänge (4') von dem Material ergriffen wird, um das Stück (30) zu halten, und das so gehaltene Stück für seinen Zusammenbau mit einer Komponente (43) verschoben wird.

35. Verfahren nach Anspruch 34, bei welchem das Stück (30) verschoben wird, damit sein freies Ende (30A) mit der Komponente (43) in Eingriff kommt.

36. Verfahren nach Anspruch 35, bei welchem die Komponente (43) einen oben offenen Behälter (40) mit einem inneren Sitzteil (44) aufweist und bei welchem das Stück (30) in den Behälter hinein über die offene Oberseite (42) verschoben wird, damit das freie Ende (30A) des Stückes mit dem Sitzteil (44) in Eingriff kommt.

37. Verfahren nach Anspruch 36, bei welchem der Behälter (40) im wesentlichen zylindrisch ist und das Sitzteil (44) im wesentlichen in der Achse des Behälters angeordnet ist und bei welchem das freie Ende (30A) des Stückes im wesentlichen entlang der Achse des Behälters für einen Eingriff mit dem Sitzteil (44) verschoben wird.

38. Verfahren nach einem der Ansprüche 31 bis 37, bei welchem die freie Endteillänge (4') des Materials in einem Greifer oder in Klauen (23) gehalten wird, bevor das Material durch den Schneider (15) abgeschnitten wird, und bei welchem das Stück (30) in dem Greifer oder in den Klauen (23) zu einer vorbestimmten Station (31) verschoben wird.

39. Verfahren nach Anspruch 38 in der Rückbeziehung auf Anspruch 36, bei welchem das Stück (30) in der vorbestimmten Station (31) ergriffen und das Stück (30) von dort in einen Eingriff mit dem Sitzteil (44) verschoben wird.

Revendications

1. Appareil d'obtention de morceaux (30) de matière flexible à partir d'une longueur continue (4) de cette matière, comprenant un poste de coupe (1) muni d'un rotor (6) et d'un moyen (8) pour faire tourner le rotor autour d'un axe (7), ce rotor comportant un guide (9) qui peut tourner avec celui-ci et qui est décalé radialement de l'axe (7) ; une partie de piste (10) dans laquelle la matière (4) est placée pour se déplacer dans le sens longitudinal de cette matière vers le guide (9) ; un moyen (11) pour déplacer la longueur (4) de matière longitudinalement à travers le guide (9) de façon qu'une longueur de partie d'extrémité libre (4') de la matière sorte du guide, et un couteau (15) par rapport auquel le rotor (6) peut tourner de façon que, pendant la rotation du rotor et de la matière (4') dans son guide, la matière s'engage contre le couteau (15) pour qu'un morceau (30) de longueur prédéterminée soit coupé de l'extrémité libre (4') de la matière, le moyen de déplacement (11), après cette opération de coupe, repérant la matière (4) pour la déplacer longitudinalement de façon qu'une autre longueur de partie d'extrémité libre (4') de celle-ci sorte du guide (9) pour la coupe d'un autre morceau (30),
caractérisé en ce que
la matière (4) est obtenue à partir d'une longueur continue (5) de cette matière par rapport à laquelle le rotor (6) tourne, et la partie de piste (10) comporte une extrémité (10A) adjacente au rotor (6), cette extrémité étant essentiellement coaxiale avec l'axe (7) du rotor et se trouvant espacée axialement de celui-ci de façon que, pendant son déplacement longitudinal, la matière (4) se déplace le long de la partie de piste (10) et que, lorsqu'elle sort de l'extrémité (10A) de la partie de piste, la matière (4) soit déplacée dans le sens radial de celle-ci sur sa longueur de partie actuelle, entre le guide (9) et la partie de piste (10).

2. Appareil selon la revendication 1,
dans lequel
le rotor (6) peut tourner de façon continue.

3. Appareil selon l'une quelconque des revendications 1 et 2,
dans lequel
pour chaque tour de rotation du rotor (6), un seul morceau (30) de matière flexible est coupé de la longueur continue de matière flexible.

4. Appareil selon l'une quelconque des revendications précédentes,
dans lequel
la matière (4) peut se déplacer longitudinalement à travers un tube de guidage (12) qui peut tourner avec le rotor (6) et qui assure la communication entre l'extrémité (10A) de la partie de piste (10) et le guide (9).

5. Appareil selon l'une quelconque des revendications précédentes,
dans lequel

le couteau (15) comprend un bord de coupe avec lequel la longueur de partie d'extrémité libre (4') s'engage pour être coupée pendant la rotation du rotor (6).

6. Appareil selon la revendication 5, dans lequel le bord de coupe est essentiellement circulaire et monté pour pouvoir tourner autour de son axe.

7. Appareil selon la revendication 6, comprenant un moyen pour faire tourner le couteau pendant la rotation du rotor.

8. Appareil selon l'une quelconque des revendications précédentes, dans lequel le moyen (11) pour déplacer la longueur de matière (4) longitudinalement comprend un moyen de rouleau dont la rotation produit ce déplacement, le moyen de rouleau (11) étant synchronisé avec le rotor (6) pour caler la matière dans son déplacement longitudinal pour la coupe.

9. Appareil selon l'une quelconque des revendications précédentes, dans lequel la longueur de matière (4) est fournie au rotor (6) par une bobine d'alimentation (5).

10. Appareil selon l'une quelconque des revendications précédentes, comprenant un moyen de transfert (2) pour transférer le morceau coupé (30) de la matière (4) vers un poste prédéterminé (31).

11. Appareil selon la revendication 10, dans lequel le moyen de transfert (2) comprend un moyen de retenue (22) qui s'engage sur la longueur de partie d'extrémité libre (4') de la matière, de façon que cette matière soit coupée entre le moyen de retenue (22) et le guide (9), le moyen de retenue (22) transportant la pièce obtenue (30) coupée à partir de la matière dans le poste prédéterminé (3).

12. Appareil selon la revendication 11, dans lequel le moyen de retenue (22) comprend une pince ou des mâchoires (23) permettant de maintenir la matière (4').

13. Appareil selon l'une quelconque des revendications 11 et 12, dans lequel le moyen de retenue (22) est synchronisé pour s'engager sur la longueur de partie d'extrémité libre (4') de la matière, juste avant que cette matière soit coupée.

14. Appareil selon l'une quelconque des revendications 11 à 13, dans lequel le moyen de transfert (2) comprend une tourelle (20) pouvant tourner autour d'un axe (21) écarté de l'axe (7) du rotor et permettant de déplacer le moyen de retenue (22) autour d'un cercle, dont une partie de la circonférence passe dans une zone qui coïncide essentiellement avec une partie de la circonférence du cercle sur laquelle la matière (4') est déplacée par le rotor (6), ce rotor (6) et le couteau (15) étant disposés pour couper la matière (4') dans cette zone, et le moyen de retenue (22) étant synchronisé de façon que, pendant la rotation de la tourelle (20), le moyen de retenue (22) s'engage sur la matière (4') lorsque ce moyen de retenue (22) pénètre dans la zone et transporte le morceau (30) de cette zone pour le transférer dans le poste prédéterminé (3).

15. Appareil selon la revendication 14, dans lequel l'axe (21) de la tourelle est essentiellement parallèle à l'axe (7) du rotor.

16. Appareil selon l'une quelconque des revendications 14 et 15, dans lequel la tourelle (20) comporte un certain nombre de moyens de retenue (22) qui sont disposés dans un réseau circonférentiellement espacé, un certain nombre des postes de coupe (1) étant espacés circonférentiellement autour de la tourelle (20) pour que les morceaux (30) provenant de chaque poste de coupe (1) soient transférés vers l'un au moins des moyens de retenue (22) du réseau sélectionné pour être synchronisé avec ce poste de coupe (1).

17. Appareil selon l'une quelconque des revendications 10 à 16, comprenant un moyen de positionnement de morceau (3) grâce auquel un morceau (30) transféré vers le poste prédéterminé (31) est appliqué à un composant (43) avec lequel ce morceau (30) doit former un ensemble.

18. Appareil selon la revendication 17, dans lequel le moyen de positionnement (3) est disposé pour déplacer le morceau à partir du poste prédéterminé (21) pour emboîter à la presse ce morceau (20) de façon qu'il s'engage dans le composant (43).

19. Appareil selon l'une quelconque des revendications 17 et 18,

dans lequel
le moyen de positionnement (3) comprend un moyen de retenue ou un autre moyen de retenue (31) pour s'engager sur le morceau (30) dans le poste prédéterminé (31), et pour transporter ce morceau (30) dans son ensemble avec le composant (43).

20. Appareil selon la revendication 19,
dans lequel
le moyen de retenue du moyen de positionnement (3) comprend une pince ou des mâchoires (71) permettant de maintenir le morceau (30).

21. Appareil selon l'une quelconque des revendications 19 et 20 lorsqu'elles dépendent de la revendication 11,
dans lequel
l'autre moyen de retenue (71) du moyen de positionnement (3) est synchronisé pour s'engager sur le morceau (30) transféré dans le poste prédéterminé (31) par le moyen de transfert (2), avant que le moyen de retenue (23) du moyen de transfert (2) libère le morceau (30).

22. Appareil selon la revendication 21 lorsqu'elle dépend de la revendication 14,
dans lequel
le moyen de positionnement (3) comprend une seconde tourelle (56) pouvant tourner autour d'un axe (54) écarté de l'axe (21) de la tourelle (20) du moyen de transfert (2), seconde tourelle (56) au moyen de laquelle l'autre moyen de retenue (71) du moyen de positionnement (3) est déplacé autour d'un cercle dont une partie de la circonférence passe dans une autre zone qui coïncide essentiellement avec le poste prédéterminé (31), autre zone dans laquelle l'autre moyen de retenue (71) de la seconde tourelle (56) est synchronisé pour s'engager sur un morceau (30) porté par le moyen de retenue (23) du moyen de transfert (2), avant que le moyen de retenue (23) du moyen de transfert (2) libère le morceau (30) pour que l'autre moyen de retenue (71) transporte ce morceau (30), pendant la rotation de la seconde tourelle (56), vers un poste d'adaptation dans lequel le morceau (30) est assemblé avec le composant (43).

23. Appareil selon la revendication 22,
dans lequel
l'axe (54) de la seconde tourelle (56) est essentiellement parallèle à l'axe (21) de la tourelle (20) du moyen de transfert (2).

24. Appareil selon l'une quelconque des revendications 22 et 23,
dans lequel
la seconde tourelle (56) comporte un certain nombre des autres moyens de retenue (71) disposés en un réseau circonférentiellement espacé, chaque autre moyen de retenue (71) s'engageant séquentiellement sur des morceaux successifs (30) placés dans le poste prédéterminé (31), pour transporter ces morceaux (30) successivement vers le poste d'adaptation.

25. Appareil selon l'une quelconque des revendications 22 à 24,
dans lequel
la seconde tourelle (56) comporte un moyen de logement (52) pouvant tourner avec celle-ci, ce moyen de logement (52) étant destiné à positionner et à transporter un composant (43), pour assembler avec celui-ci un morceau (30) porté par l'autre moyen de retenue (71).

26. Appareil selon la revendication 25 lorsqu'elle dépend de la revendication 24,
dans lequel
la seconde tourelle (56) comporte un réseau circonférentiellement espacé de sièges (52) associés chacun à l'autre moyen de retenue (71) de façon qu'un composant (43) placé et transporté sur un siège (52) puisse être assemblé avec un morceau (30) porté par l'autre moyen de retenue (71) associé à ce siège (52).

27. Appareil selon l'une quelconque des revendications 22 à 26,
dans lequel
l'autre moyen de retenue (71) est monté de manière à pouvoir se déplacer sur la seconde tourelle (56), et commandé de façon que, pendant la rotation de cette tourelle (56), l'autre moyen de retenue (71) et un morceau (30) transporté par celui-ci, soient déplacés successivement pour que le morceau (30) soit assemblé avec le composant (43) dans le poste d'adaptation, pour que l'autre moyen de retenue (71) libère le morceau (30) du composant (43), et pour que l'autre moyen de retenue (71) se retire de l'ensemble du composant (43) et du morceau (30), en préparation à ce que cet autre moyen de retenue (71) s'engage sur un autre morceau (30) dans le poste prédéterminé (31).

28. Appareil selon la revendication 27,
dans lequel
le déplacement de l'autre moyen de retenue (71) sur la seconde tourelle (56) est déterminé par le déplacement relatif entre un moyen de piste de came (63) et un moyen suiveur de came en coopération (62), ce déplacement relatif étant effectué pendant la rotation de la seconde tourelle (56).

29. Appareil selon l'une quelconque des revendications 17 à 28,
dans lequel
le moyen de positionnement de morceau (3) com-

prend un siège (52) destiné à recevoir un récipient cylindrique à sommet essentiellement ouvert (40), ce récipient comportant un logement (44) placé essentiellement sur son axe, logement (44) dans lequel une extrémité libre (30A) du morceau (30) doit s'engager, et le moyen de positionnement (3) comprenant une tête (60) qui porte le morceau (30) de façon qu'une extrémité (30A) de celui-ci soit déplacée le long de l'axe d'un récipient (40) dans le siège (52), pour que l'extrémité (30A) du morceau soit adaptée en s'engageant dans le logement (44) du récipient.

30. Appareil selon l'une quelconque des revendications précédentes,
dans lequel
la matière consiste en un tuyau de matière plastique.

31. Procédé d'obtention de morceaux (30) de matière flexible à partir d'une longueur continue (4) de cette matière, comprenant le déplacement de la longueur de matière longitudinalement le long d'une piste (10) et à travers un guide (9) formé dans un rotor (6), de façon qu'une longueur de partie d'extrémité libre (4') de la matière sorte du guide (9) ; et l'entraînement en rotation du rotor (6) autour d'un axe (7) de façon que le guide (9) soit décalé radialement de l'axe (7) pour que la longueur de partie d'extrémité libre (4') de la matière soit déplacée circonférentiellement et que, pendant ce déplacement circonférentiel, on fasse passer la matière (4') sur un couteau (15) pour couper la longueur de partie d'extrémité libre (4') de la matière, et pour former un morceau (30) de celle-ci,
caractérisé en ce qu'
il consiste à obtenir la matière (4) à partir d'une source (5) par rapport à laquelle le rotor (6) tourne, cette source (5) fournissant une longueur continue de matière, et à déplacer longitudinalement la matière vers le guide (9) à partir d'une extrémité (10A) de la piste (10), cette extrémité étant essentiellement coaxiale avec l'axe (7) du rotor (6), et espacée axialement du rotor (6), la longueur de partie actuelle de la matière (4) entre l'extrémité de piste (10A) et le guide (9), étant déplacée radialement par rapport à l'axe (7).

32. Procédé selon la revendication 31,
dans lequel
la matière (4) est un tuyau de matière plastique.

33. Procédé selon l'une quelconque des revendications 31 et 32,
consistant à
faire tourner de façon continue le rotor (6) et caler la longueur de matière (6) pour la déplacer longitudinalement afin de couper les morceaux (30) successivement dans la matière (4) pendant la rotation du rotor (6).

34. Procédé selon l'une quelconque des revendications 31 à 33,
consistant à
engager la longueur de partie d'extrémité libre (4') de la matière avant de couper cette longueur de partie d'extrémité libre (4') de la matière, afin de retenir le morceau (30) et de déplacer le morceau (30) ainsi retenu pour l'assembler avec un composant (43).

35. Procédé selon la revendication 34,
consistant à
déplacer le morceau (30) pour qu'une extrémité libre (30A) de celui-ci s'engage avec le composant (43).

36. Procédé selon la revendication 35,
dans lequel
le composant (43) comprend un récipient à sommet ouvert (40) comportant un logement (44) dans celui-ci, et le procédé consiste à déplacer le morceau (30) dans le récipient, par le sommet ouvert (42), de façon que l'extrémité libre (30A) du morceau s'engage dans le logement (44).

37. Procédé selon la revendication 36,
dans lequel
le récipient (40) est essentiellement cylindrique et le logement (44) est placé essentiellement sur l'axe du récipient, le procédé consistant à déplacer l'extrémité libre (30A) du morceau essentiellement suivant l'axe du récipient, pour qu'elle s'engage dans le logement (44).

38. Procédé selon l'une quelconque des revendications 31 à 37,
consistant à
retenir la longueur de partie d'extrémité libre (4') de la matière dans une pince ou des mâchoires (23) avant que la matière soit coupée par le couteau (15), et déplacer le morceau (30) dans la pince ou les mâchoires (23) jusqu'à un poste prédéterminé (31).

39. Procédé selon la revendication 38 lorsqu'elle dépend de la revendication 36,
consistant à
engager le morceau (30) dans le poste prédéterminé (31) et déplacer ce morceau (30) de celui-ci pour l'engager dans le logement (44).

FIG. 1

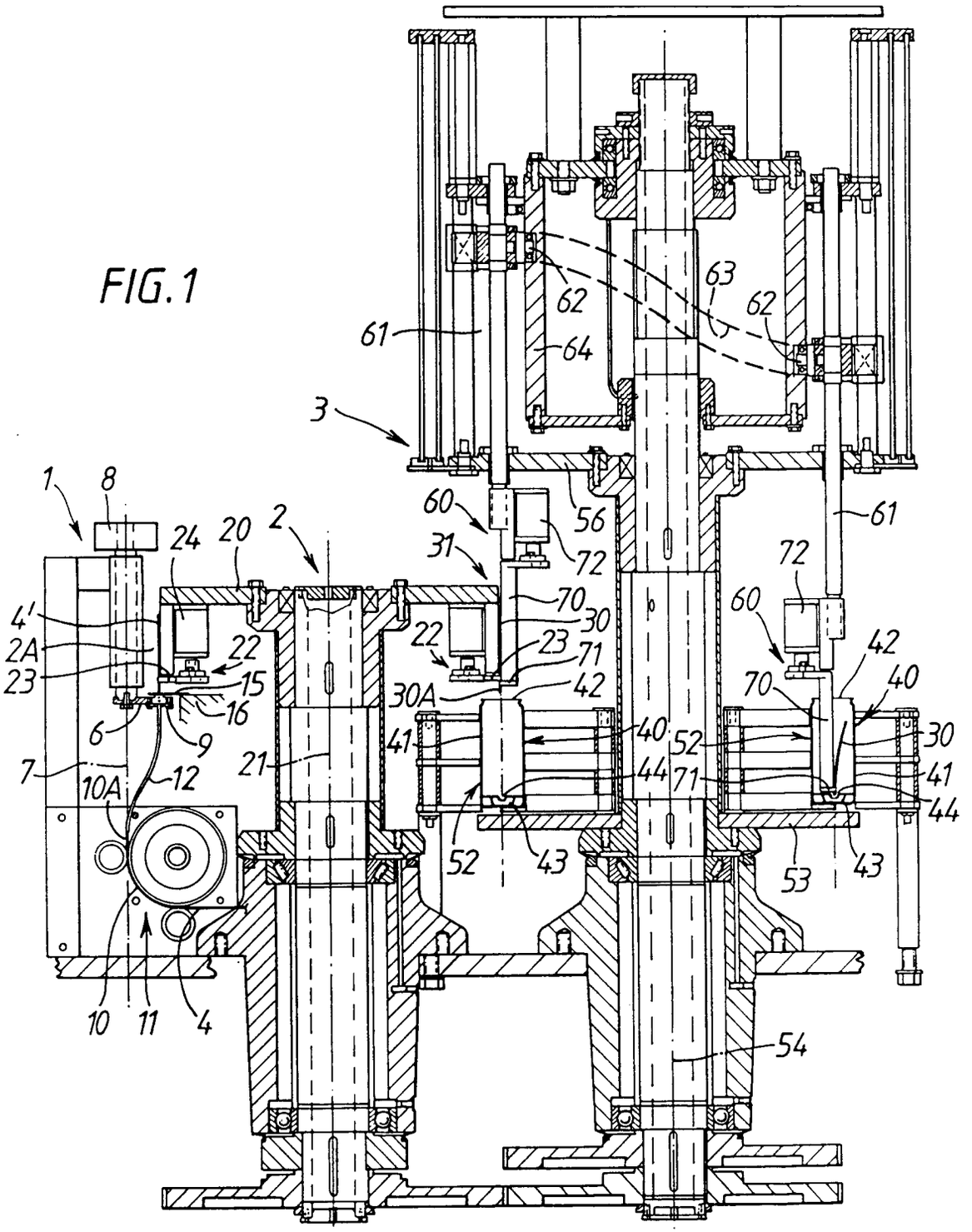
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FIG. 2

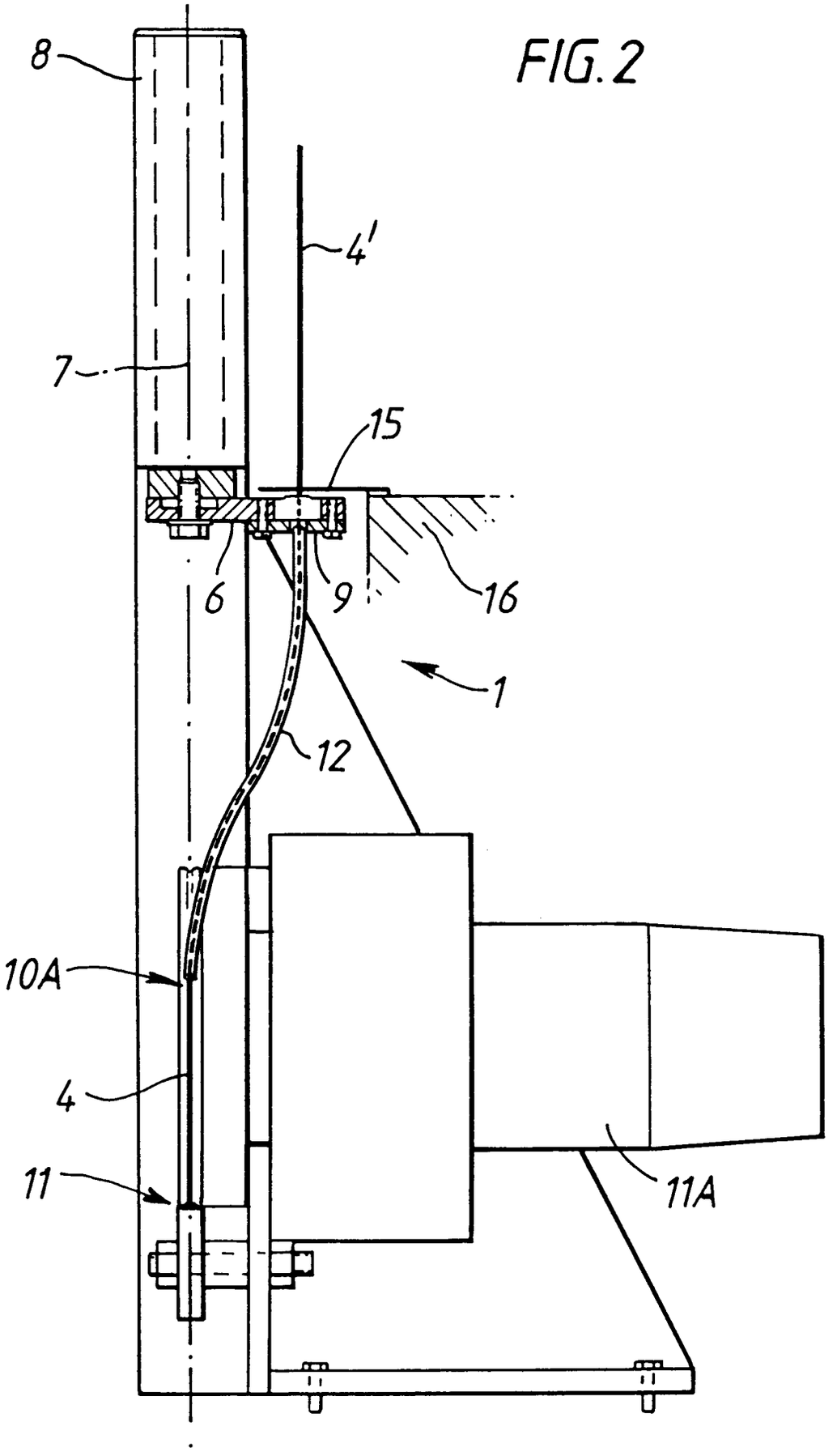
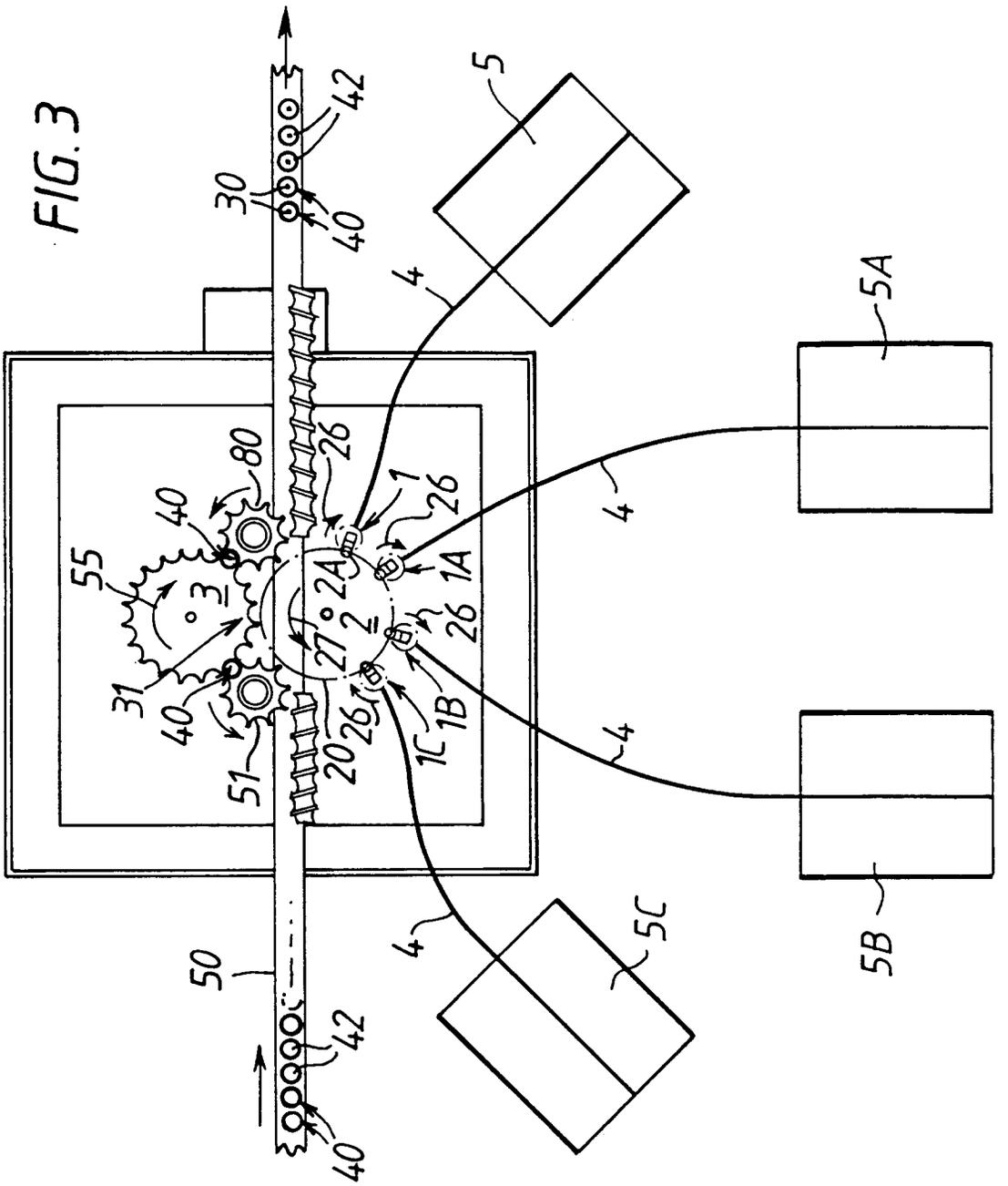


FIG. 3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40