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(72) Inventors:  
 • **Toniato, Maurizio**  
**21012 Cassano Magnago (Varese) (IT)**  
 • **Trezzi, Roberto**  
**20025 Legnano (Milano) (IT)**

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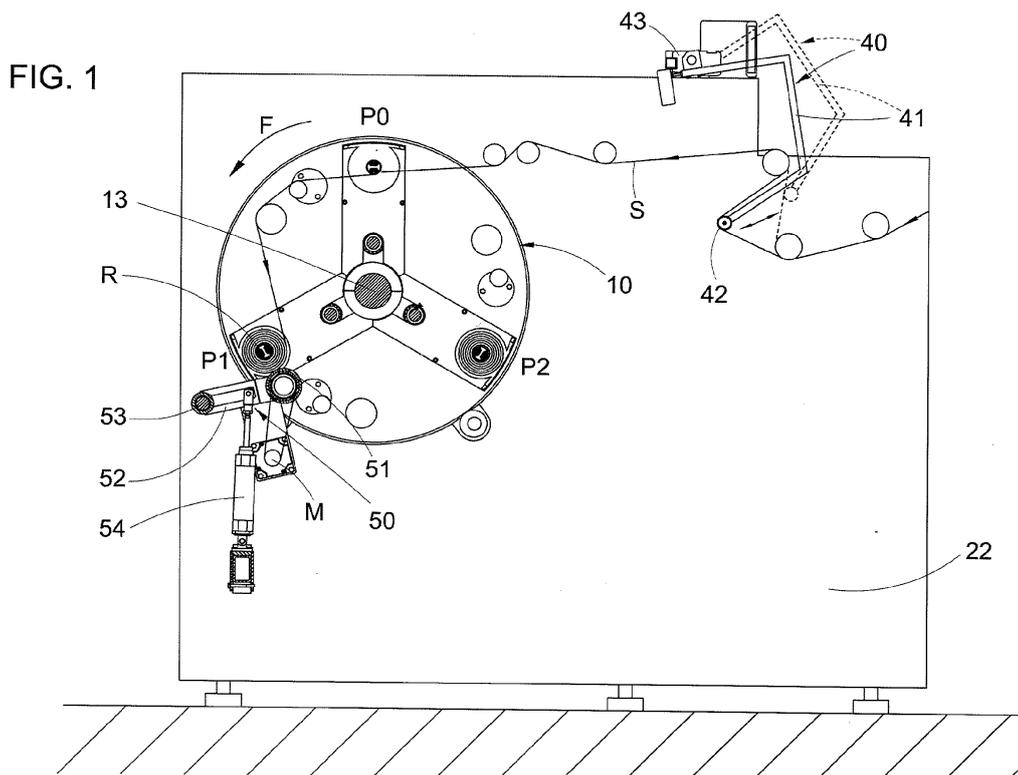
(74) Representative: **Petruzzello, Aldo**  
**Racheli S.r.l.**  
**Viale San Michele del Carso, 4**  
**20144 Milano (IT)**

(71) Applicant: **Mobert S.r.l**  
**21053 Castellanza VA (IT)**

(54) **Device and method for the winding of a plurality of rolls of pre-cut bags on a single axis**

(57) A description is given of a device for winding on a single axis (A) a plurality of rolls (R) of pre-cut bags fed in parallel strips or tracks (S), comprising, for each strip of bags (S), a contrast roller (51), normally idle and resting on the relative roll (R), means (40) suitable for detecting the tension of said strip of bags (S) and means (M), con-

trolled by the detecting means (40) when a slackening in the strip of bags (S) is detected, for making said roller (51) rotate at a peripheral speed greater than that of the strip of bags (S), making said roll (R) rotate at an angular speed greater than that of the other rolls on the same axis (A).



## Description

**[0001]** The object of the present invention is a device and a method of winding on a single axis of a plurality of rolls of pre-cut bags.

**[0002]** In the present description "pre-cut bags" refers to plastic film bags both with open mouth, of the refuse collection type, and so-called "shopper" bags, with punched handles, used in particular in the fruit and vegetable sections of supermarkets.

**[0003]** These bags are produced, in a manner in itself known, from flattened tubular films, whereon operations of sealing, optional punching and pre-cutting are performed, in successive phases, in order to facilitate the separation of the bags from the roll during use.

**[0004]** In order to produce several rolls of bags simultaneously, machines with several tracks with several independent winding assemblies, one for each track, are currently used.

**[0005]** This solution of using separate and independent winding assemblies is too costly, due to the fact that the members necessary for the functioning of the machine are multiplied by the number of the tracks, starting from the motor drives of the various assemblies.

**[0006]** Moreover independent winding assemblies do not allow adaptation in a simple manner of the machine to the winding of strips of pre-cut bags of different width.

**[0007]** It would therefore be preferable to have a machine with several tracks with a single axis of winding of the various strips of pre-cut bags.

**[0008]** However the different strips of bags being wound on the same axis can be of different thickness or have folds, thus determining differential tensions in the different strips of bags in that, on a par with the number of turns of the winding axis, the peripheral speed of winding varies as a function of the diameter of the roll, or rolls of bags are created with different diameter on a par with the number of bags wound.

**[0009]** This entails slackenings of one or more tracks which, winding on drive rollers due to the lack of any tensioning, consequently tear, making machining impossible unless using coils of film with extremely narrow thickness tolerances.

**[0010]** Moreover, if after winding the pre-cuts of the bags are not aligned at the end of the rolls, it is not possible to detach simultaneously all the bags of the different tracks being machined, thus creating machine stops and manual work in order to match up the tracks. The tracks are not aligned if the diameters of the rolls being wound are different.

**[0011]** This is the reason why machines with several tracks on a single winding axis have not been proposed hitherto.

**[0012]** The same Applicant had produced such a machine with several tracks with a single winding axis, without however succeeding in matching up the tracks optimally, i.e. obtaining rolls of the same diameter and with the same number of pre-cut bags, without damaging the

product.

**[0013]** The object of the invention is that of eliminating the disadvantages of the prior art described above, allowing the winding on a single axis of a plurality of rolls of pre-cut bags, compensating automatically and in real time possible differences in diameter between the various rolls, without the risk of damaging the material of the bags being wound.

**[0014]** This object is achieved by the device and by the method according to the invention which have the features of the appended independent claims 1 and 7.

**[0015]** Advantageous embodiments of the invention are disclosed by the dependent claims. Substantially the device of winding on a single axis of a plurality of rolls of pre-cut bags according to the invention comprises, for each track, or for each strip of bags, a contrast roller normally idle and kept in contact with the relative roll being wound, means suitable for detecting the tension of said strip of bags and, in the case of slackening, for actuating said contrast roller at a peripheral speed greater than that of the strip of bags, making said roll rotate at an angular speed greater than that of the other rolls on the same axis, so as to return the strip of bags to correct tension.

**[0016]** The axis of winding comprises a spindle whereon sleeves are mounted by means of free-wheel mechanisms, suitable for receiving the core of the rolls being wound, said free-wheel mechanisms being such as to allow the coupling of the spindle with the sleeves only in the direction of winding.

**[0017]** An axial channel for feeding compressed air is provided in the spindle wherefrom at least one radial channel branches off at each sleeve wherein at least one hole is provided for the passage of the air which will go to inflate a respective expandable membrane suitable for locking a respective core.

**[0018]** Further features of the invention will be made clearer by the following detailed description, referred to a purely non-limiting example thereof, illustrated in the accompanying drawings in which:

Figure 1 is a schematic side view of a device of winding on a single axis of a plurality of rolls of pre-cut bags according to the invention;

Figure 2 is a schematic cross section of the device of Figure 1;

Figure 3 is a schematic view of the axis of winding of the rolls;

Figures 4 and 5 are enlarged views respectively of the left part (shown for convenience in different proportions) and of the central part of the axis of winding of Figure 3.

**[0019]** The device shown in the appended Figures 1 and 2 represents the final station of a machine for the production of rolls of bags which, in a manner in itself known, is fed by tubular films of plastic material which, in successive stations placed upstream of the winding

station, perform the sealing, the pre-cutting and the optional punching of the tubular films in order to obtain strips of bags to be wound into rolls.

**[0020]** The machine as a whole is to be considered known and therefore will not be described further.

**[0021]** In the case in question the machine is with several tracks, in particular three (see Figure 2), wherein the strips of bags denoted by S1, S2, S3 in Figure 2 and generically by S in Figure 1 are wound into rolls R on a single winding axis A, whose structure will be described here below.

**[0022]** Herein below the strips of bags S, for convenience, will also be referred to as tracks or films, given that they are made up of tubular films.

**[0023]** The axis of winding A is carried by the opposite side panels 11, 12 of a turntable 10 rotating around a central axis 13 and supported by intermediate supports mobile along the axis 13 in order to adapt their distance to the width of the roll R to be formed.

**[0024]** In the drawings 21 and 22 instead denote the side panels of the machine.

**[0025]** During the functioning of the machine the turntable 10 is rotated sequentially through 120° in order to bring the winding axis A from a position of winding start P0 to a working position P1 where the roll R is formed and an unloading position P2 where the roll of bags formed is unloaded (Figure 1).

**[0026]** The same layout can be applied also on turntables provided with a different number of stations (2, 4 and over).

**[0027]** Figure 1 shows a roll R in the phase of winding in the position or station P1 and a roll ready to be unloaded in the position P2. When the roll R has reached the diameter set in the work station P1 the strip of bags S is separated in the zone of pre-cutting between P0 and P1 and starts the winding in the position P0, after which the turntable 10 is rotated through 120° so that the roll continues to wind in the work station P1, while the roll formed goes to the unloading station P2.

**[0028]** The above is in any case to be considered known and therefore will not be described in detail.

**[0029]** As described previously, the problem which arises in the winding of several separate strips of bags S on a single winding axis A is that when the latter, made up of tubular films, are rolled, during the overlapping of the various turns different diameters of rolls can be created, due to the different thickness of the material and/or folds which can be formed on some of the strips of bags S.

**[0030]** Since the peripheral linear speed varies as a function of the diameter of the roll, if the rolls R1, R2, R3 being wound have different diameters, different tensions are determined on the various strips of bags S, with misalignment of the pre-cuts and the problems described previously.

**[0031]** In order to solve this problem the winding device according to the invention comprises, for each strip of bags S, means 40 suitable for detecting the tension of said strip of bags S and means 50 suitable, if necessary,

co-operating with the axis A, for accelerating the winding of the film.

**[0032]** In the embodiment illustrated in Figure 1, the means of detecting the tension of the strip of bags S are made up of a rocker arm 41 which rests, with a feeler 42, on the strip of bags S, and a sensor 43 which determines the tension of the strip of bags S by detecting the angular position of the rocker arm 41. In the drawing the rocker arm 41 is shown with dotted lines in condition of normal functioning, i.e. with the film S which advances at the right tension, while with unbroken lines in a condition of slackening, due to a lesser winding of film on the roll R, therefore with a smaller diameter.

**[0033]** The means 50 comprise a contrast roller 51 carried by a pair of arms 52 pivoted in 53 and held by a piston 54 in contact or resting with the roll being wound R. The contrast roller 51 is normally idle and, resting on the roll, compresses it, releasing the air which is created between the layers of the tubular film S.

**[0034]** The roller 51 is in any case provided with a motor drive M which is actuated in the manner to be mentioned here below.

**[0035]** The axis A, illustrated in Figures 3-5, comprises a spindle 60 which in the example shown is divided into two parts 60', 60" which join centrally at the head by means of two conical ferrules 61. The provision of the spindle in two parts is useful because it facilitates the unloading of the rolls formed, with withdrawal of the two parts from the two side panels of the machine. It is however evident that the spindle can be formed in a single piece and here below in this description, for convenience, reference will be made to the spindle 60 without further specifying that it is formed in several parts.

**[0036]** Rigid sleeves 62 are mounted on the spindle 60 by means of free-wheel mechanisms 70 in a number equal to the number of the rolls R to be wound, three in this case. It is however clear that the number of sleeves 62 can be varied as a function of the number of rolls R. The free-wheel mechanism is a device in itself known in the art and therefore will not be described further. In practice it allows the coupling of the spindle with the sleeves only in one direction of rotation (that of winding) so that the sleeves, driven to rotate by the spindle, can rotate only in the direction of the winding, if necessary at a speed higher but not lower than that of the spindle. Externally to each free wheel 70, placed at a respective end of a corresponding sleeve 62 between the latter and the spindle 60, an airtight seal 71 is placed.

**[0037]** A respective expandable membrane 63 is placed on each sleeve 62, held in position by means of two locking rings 64 attached to the sleeve by means of screws 65. An airtight OR ring 66 is placed between each ring 64 and the sleeve 62.

**[0038]** An axial channel 67 for feeding compressed air is provided in the spindle 60, wherefrom at least one radial channel 68 branches off at each sleeve 62, wherein at least one hole 69 is provided for the passage of the air which will go to inflate the respective expandable

membrane 63 which locks a respective core (80), normally in cardboard, fitted on the sleeve and whereon a respective strip of bags S is wound to form a respective roll R. The aforesaid seals 66 and 71 prevent the release of the air and allow the expandable membrane 63 to be kept inflated during the winding.

**[0039]** The sleeves 62, driven by the respective free-wheel mechanisms 70, all rotate at the same speed as the spindle 60 during the normal winding and are held axially in position by spacers 73 interposed between successive sleeves.

**[0040]** When the means 40 detect a slackening of the corresponding film S, i.e. when the rocker arm 41 is placed for example in the unbroken line position illustrated in Figure 1, which, as mentioned, is caused by a reduction in the diameter of the roll of the corresponding track with respect to those of the others, the sensor 43 pilots the motor M which rotates the roller 51 at a higher peripheral speed than that of the corresponding film or strip of bags S, rotating faster the corresponding sleeve 62 with respect to the spindle 60. In this way the excess film due to the slackening of the corresponding track is recovered by winding it on the roll by means of a higher speed of rotation of the roll and consequently matching up the tracks.

**[0041]** When the rocker arm 41 returns into the position indicated with dotted lines in Figure 1, indicating that the corresponding strip of bags S has reached the correct degree of tensioning, actuation takes place of the stop of the motor M and of the disengaging from the roller 51 which returns to rotate idle through the contact with the roll R.

**[0042]** From what is described the advantages appear clear of the invention which allows a plurality of rolls of pre-cut bags to be wound on a single axis, maintaining the single strips of bags perfectly matched up.

**[0043]** Naturally the invention is not limited to the particular embodiment previously described and illustrated in the accompanying drawings, but numerous detailed changes may be made thereto, within the reach of the person skilled in the art, without thereby departing from the scope of the invention itself as defined by the appended claims.

## Claims

1. Device for winding on a single axis (A) a plurality of rolls (R) of pre-cut bags fed in parallel strips or tracks (S), **characterised in that** it comprises, for each strip of bags (S), a contrast roller (51), normally idle and resting on the relative roll (R), means (40) suitable for detecting the tension of said strip of bags (S) and means (M), controlled by the detecting means (40) when a slackening in the strip of bags (S) is detected, for making said roller (51) rotate at a peripheral speed greater than that of the strip of bags (S), making said roll (R) rotate at an angular speed greater

than that of the other rolls on the same axis (A), wherein said axis (A) comprises a spindle (60) on which sleeves (62), suitable for receiving the core (80) of the rolls (R) being wound, are mounted by means of free-wheel mechanisms (70), said free-wheel mechanisms (70) being such as to allow the coupling of the spindle (60) with the sleeves (62) in the winding direction only.

2. Device according to claim 1, **characterised in that** an axial channel (67) for feeding compressed air is provided in said spindle (60), wherefrom at least one radial channel (68) branches off at each sleeve (62), wherein at least one hole (69) is provided for the passage of the air which will go to inflate a respective expandable membrane (63) suitable for locking a respective core (80).

3. Device according to any one of the preceding claims, wherein said detecting means (40) comprise a rocker arm (41) with feeler (42) which rests on the strip of bags (S) and a sensor (43) which detects the tension of the strip of bags (S) by detecting the angular position of the rocker arm (41).

4. Device according to claim 1, wherein said roller (51) is carried by a pair of oscillating arms (52) actuated by an actuator (54) suitable for keeping said contrast roller (51) always in contact with the roll being wound (R) at a constant pressure.

5. Device according to any one of the preceding claims, **characterised in that** said single winding axis (A) is carried by a rotating turntable (10) with at least two stations in order to be moved sequentially from a working position (P1), wherein the rolls (R) are formed, to a position (P2) of unloading of the finished rolls.

6. Method of winding on a single axis (A) of a plurality of rolls (R) of pre-cut bags fed in parallel strips or tracks (S), **characterised in that** it provides the detection of the tension of each strip of bags (S) and, in the case of slackening of a strip (S), the rotation of a roller (51) which is normally kept idle and in contact with the corresponding roll (R) being formed at a speed greater than that of the strip of bags (S) making said roll (R) rotate at an angular speed greater than that of the other rolls on the same axis (A).

7. Method according to claim 6, **characterised in that** the tension of the strip of bags (S) is detected by an angular position sensor (43).

8. Method according to claim 6 or 7, **characterised in that** said contrast roller (51) is kept resting against the roll being wound (R) at a constant pressure.

9. Method according to any one of claims 6 to 8, wherein the transfer of the single winding axis (A) from a working position (P1) wherein the roll (R) is formed to a position (P2) of unloading of the finished roll is provided, by means of sequential rotations of a turntable (10).

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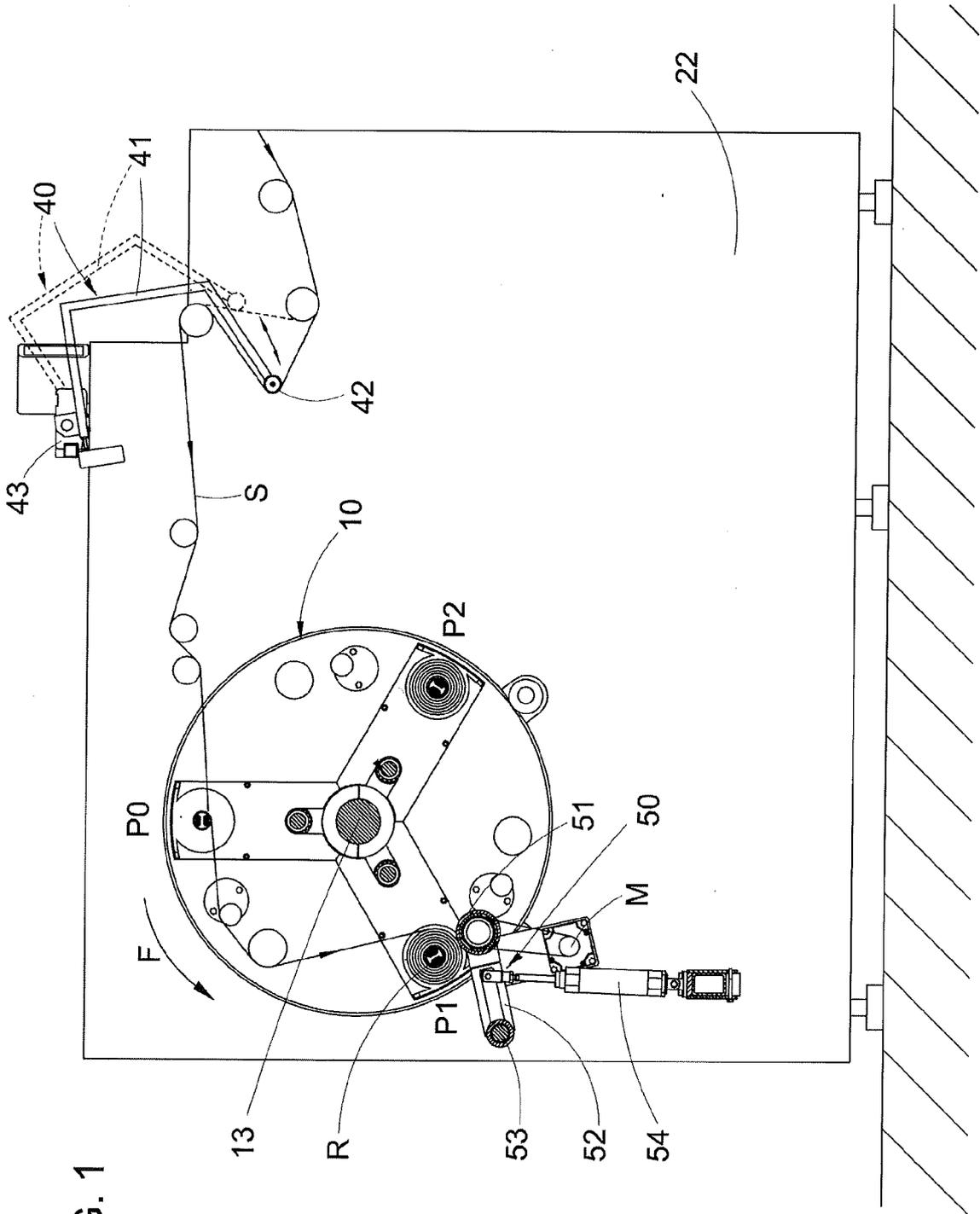
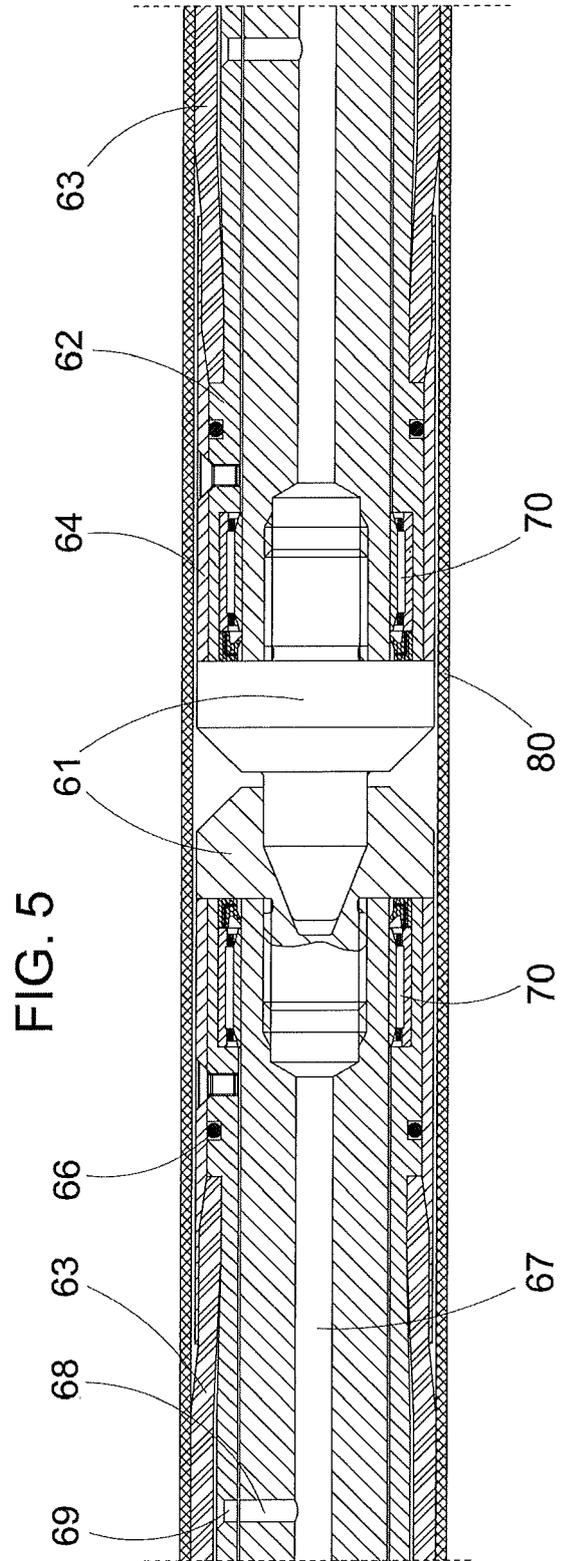
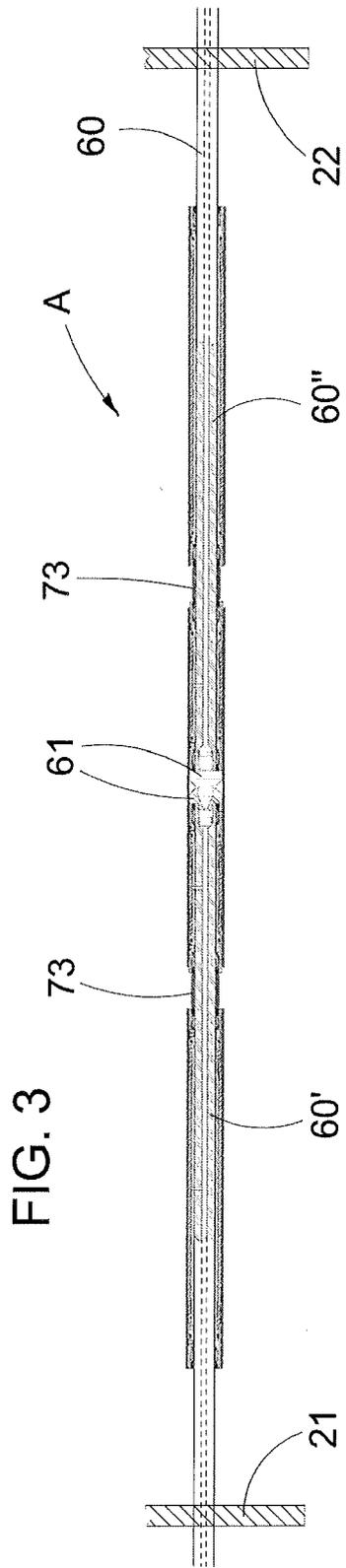


FIG. 1





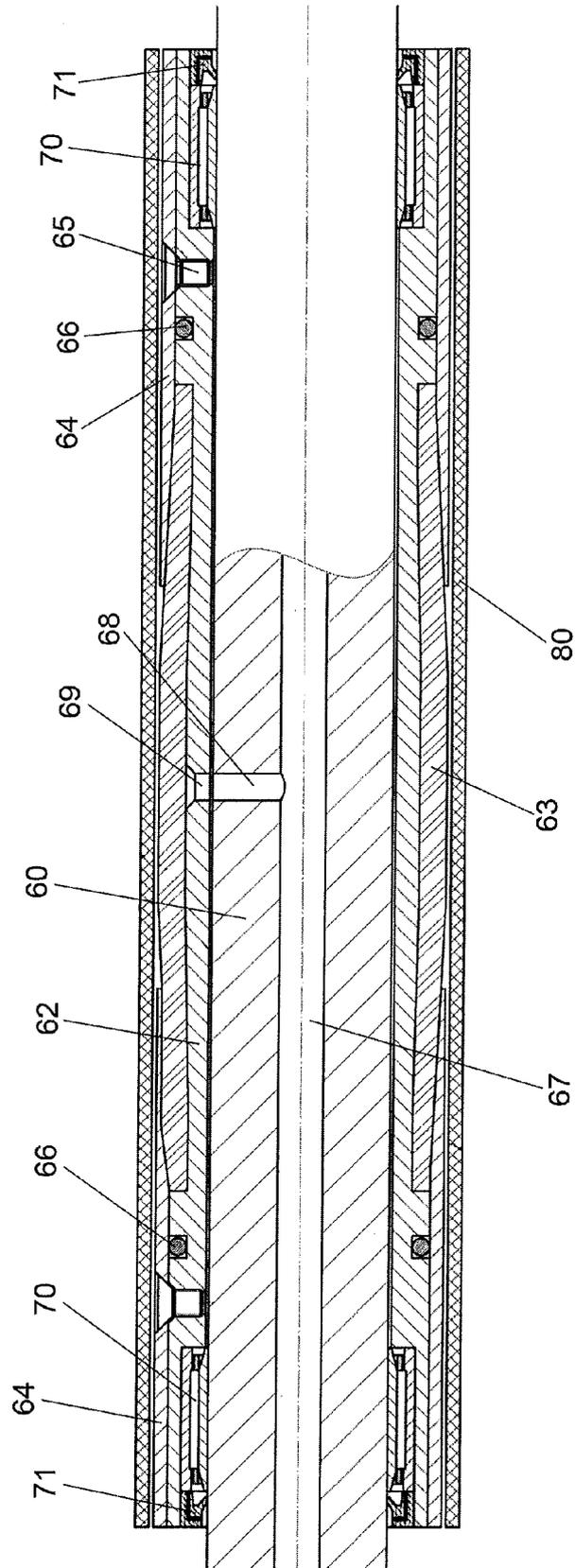


FIG. 4



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Application Number  
EP 14 15 1343

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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 1 April 2014	Examiner Piekarski, Adam
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ..... & : member of the same patent family, corresponding document	

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