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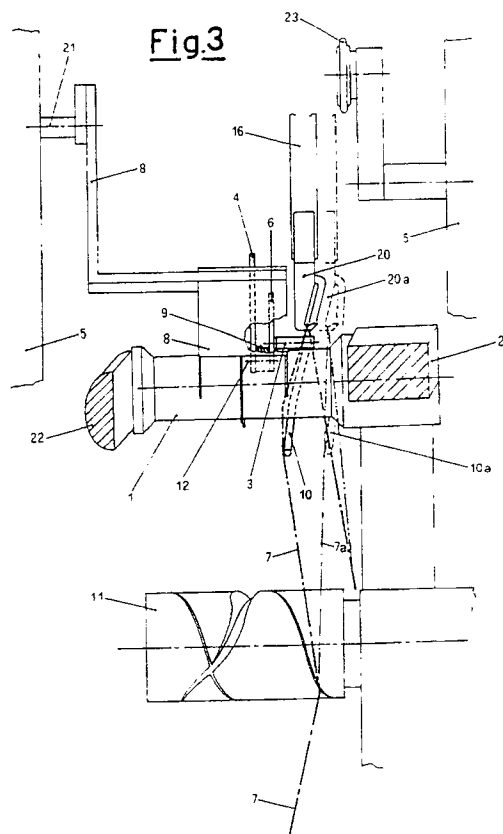
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(54) **A device for anchoring the thread to the surface of the winding bobbin.**

(57) The present invention relates to a device that may be carriage-mounted and which enables the initial end of the thread to be anchored to the surface of the winding bobbin on which the reel is being formed, this device comprising:

- an arm which picks up, holds and places the bobbin between the centres of the reel-holder mandrel and the said arm also supports an appropriately-shaped lever which rests initially, with its flat end, against the surface of the bobbin and subsequently rests with a roller fixed freely close to its flat end. The said roller holds the thread tightly against the circumferential surface of the bobbin at a point inside the reel being formed and for the entire time required to wind on the first coils of wound thread;
- a linkage which has a gripper element, a cutter element and a rod-shaped element for moving the thread to the thread anchorage point and start of winding point on the bobbin to form the reel. The said anchorage point of the thread on the surface of the bobbin is located in the section of axial travel of the windings of thread.



EP 0 432 837 A2

' "A DEVICE FOR ANCHORING THE THREAD TO THE SURFACE OF THE WINDING BOBBIN"

The present invention relates to a device that may be carriage-mounted and which enables the initial end of the thread to be anchored to the surface of a winding bobbin on which the reel is being formed and the said anchorage is made in the section of axial travel of the windings of criss-cross thread.

It is known that on completion of the spinning or spooling process the "thread" product is normally supplied in criss-cross-wound cylindrical or conical reels. The said reels may be of any shape and size and in the Description and Claims shall simply be called textile cops, or reels, or yarn packages using these terms interchangeably.

In some cases where in subsequent stages of the production process the known reserve of initial windings of thread wound in a section of cop located exterior to the reel is not used, because the end of a spent reel need not be joined to the beginning of another new reel without stopping the machine or process in progress, in such cases it is a great advantage to begin winding the thread onto the bobbin in a section inside the reel to be formed. For example, the above-mentioned cases apply in double-twist twisting frames or in the operation of doubling two or more threads wound on reels. Clearly, in the said cases and in other cases with similar requirements, the formation of one or more initial coils of thread wound onto the bobbin, located at one end and exterior to the reel being formed, constitutes a waste of material and loss of time to remove the said coils of thread while the reel is being used, since the said coils are often frayed due to the damaging crushing and friction action of the supply cylinder.

In the current state of the art automatic spoolers exist which have reel-carrier arms with mandrels (centres) the function of which is to carry, centre and fix the bobbin, but also to enable the first coils of the start of reel formation to be wound onto the bobbin.

The said first coils are usually formed by securing the thread end, with a known device, at the start of the spooling cycle between the end of the bobbin and the mandrel (centre) of the reel-carrier arm.

In current winding machines, such as automatic spoolers, automatic cutting of the thread between the reel of thread and clamping in the mandrel does not take place during winding for the formation of the reel. In this way when the reel is removed on completion of winding, to replace it with an empty bobbin, the said completed reel will be moved by means of chutes or conveyor belts, along which the section of thread previously

gripped between the bobbin and mandrel will be free and hanging down often causing the said initial winding coils to unwind. This will give rise to a free thread end of a certain length which while the reel is being transported and moved will inadvertently join with the free thread ends of other reels.

As a result the free thread ends become entangled and these tangles create considerable problems when the reels must be separated. In this case, intervention by an operator to cut the said joins and eliminate the dangers of blockage in the transportation and movement of reels to subsequent production stages is absolutely unavoidable.

Manual intervention by the service operator is certainly not the best method of obtaining proper reliability of the movement of reels. Understandably, in operational tasks performed by chance, and therefore operations which are not scheduled and regular in time, labour performance is low. Another aspect which is certainly of no less importance is that tail ends of thread hanging from the reels supplying the double-twist twisting frames interfere with the threads being unwound which are drawn close to be twisted together. This interference often causes one of the two threads to break thus interrupting the double-twist twisting process. Stoppages of production like those mentioned above, even if reduced to a low percentage incidence, with the high rate of production in today's machines, take on considerable importance due the delays they involve in restarting the production cycle.

To overcome the above-mentioned problems, the Applicant has tried and tested a device of definite reliability for hooking the thread onto the winding bobbin, inside the axial section of the reel being formed, without thus leaving at the end of winding any section of free hanging thread.

The said device has been successfully installed by the Applicant on the movable lifting carriage at the reel winding front. This avoids high installation costs since the device in question uses for its housing and its movement a movable carriage which is already in existence, and this in itself, apart from being extremely advantageous, is also very safe and provides an excellent solution to both the general and specific problems posed by such a problematical situation.

The present invention is therefore proposed not only to relieve service personnel of the task of dealing with the above-mentioned entanglement of free threads from the reels, but also has the aim of ensuring correct operation as regards twisting and doubling.

In accordance with this the present invention

relates to a device which enables the initial end of thread to be anchored to the surface of the winding bobbin on which the reel is being formed comprising in reciprocal co-operation and co-ordination:

- an arm which picks up, holds and places the bobbin between the centres of the reel-holder mandrel and the said arm also supports a curved lever which rests initially, with its essentially flat end, against the surface of the bobbin and subsequently, after securing the bobbin between the centres, the said lever rests pushing against the surface of the bobbin with a roller fixed freely close to its essentially flat end and the said roller holds the thread tightly against the circumferential surface of the bobbin at a point inside the reel being formed and for the entire time required to wind on the first coils of wound thread;
- a linkage which has a gripper element, a cutter element and a rod-shaped element for moving the thread underneath the above-mentioned roller and to the thread anchorage point, or section, and start of winding point on the bobbin to form the reel, as the package of thread to be obtained.

The curved lever, which is supported by the said arm, is constantly pushed against the surface of the bobbin by an elastic element, such as a spiral spring fitted round the rotation pin of the said lever.

The starting point of anchorage of the thread to the surface of the bobbin is located in the section of axial length inside the reel being formed. In one embodiment the device covered by the present invention is housed in a carriage that moves along the entire winding front.

A preferred embodiment of the invention is now described, for the purpose of illustration but in no way limiting, with the help of the attached drawings in which:

- Fig. 1 is a schematic side view of the device covered by the present invention and the said view shows the moment when the arm is holding the empty bobbin and the completed reel is descending a chute;
- Fig. 2 is a schematic side view of the device covered by the present invention and the said view shows the moment when the arm has placed the bobbin between the centres of the reel-carrier mandrel and the curved lever is resting its essentially flat end on the bobbin and the said view also shows the rod-shaped element in the rotated position since it has moved the thread round the roller and into an axial position inside the reel to be formed;
- Fig. 3 is a front schematic view of the operating moment shown in Figure 2 and also shows, in a raised at rest position, the friction

wheel that will activate the rotation of the bobbin to deposit the first coils of wound thread;

- Fig. 4 is a schematic side view of the device covered by the present invention and the said view represents the moment when the roller of the lever is resting on the bobbin and holding the thread tightly against the circumferential surface of the said bobbin while the cutting element has cut the thread leaving the reel free to move along known conveyor belts;
- Fig. 5 is a front schematic view of the operating moment shown in Figure 4 and also shows, in the working position, the friction wheel which is activating rotation of the bobbin to deposit the first coils of wound thread.

In the Figures the same parts bear the same reference numbers for simplicity. The devices and mechanisms that operate in reciprocal co-operation with the device covered by the present invention are not shown and their operation is not described since they are already known, and also because they do not affect the operation of the invention in question.

In the attached drawings: 1 is the bobbin supporting the criss-cross windings of thread for the formation of reel 14 of any shape and size. 2 is the cutting element of cutting blade advantageously positioned close to and coupled with gripper element 20. Cutter 2 and gripper 20 elements are activated and supported by a linkage which comprises a rod 18 moved by a pneumatic or electro-mechanical actuator 16; 3 is the roller fixed freely to curved lever 6; 4 is the supporting element or bar of lever 6. The said bar 4 is fixed as a single body at one of its ends to arm 8 and at the other end it has a pin 12 around which lever 6 pivots with the possibility of rotating; 5 is the outline of the movable lifting carriage which moves along the entire winding front and also houses the device covered by the present invention; 8 is the arm which picks up, holds and places bobbin 1 between the centres of reel-carrier mandrel 22. The said arm pivots and rotates round pin 21; 9 is a spiral spring fitted round pin 12 and the said spring 9 constantly pushes lever 6 against the surface of bobbin 1; 10 is the rod-shaped element which rotates around rod 18 by means of a bush element 13; 11 is the grooved supply cylinder or motor-roller driving the reel being formed (shown here schematically since it is irrelevant for the purposes of the present invention); 15 is the outline of a portion of movable sheeting which positions thread 7 and guides the fall of completed reel 14 as the latter is ejected; 23 is the friction wheel that activates the rotation of bobbin 1 to deposit the first coils of wound thread; A-A is the line of the cross-

sectional plane and corresponds to the side views in Figures 1, 2 and 4.

The device covered by the present invention, illustrated in detail in the attached Figures, operates in a manner which is easily understood.

There now follows a description of the operating sequence of the device for anchoring the thread to the surface of the winding bobbin on changing reel 14, i.e. on lifting out a full reel 14 to replace it with an empty bobbin 1.

The known lifting carriage 5 is moved along the winding front until it is positioned at the spooling unit in which the lift is required. In this position arm 8 picks up bobbin 1 from a bobbin supply device of the appropriate constructional type and of known state of the art while the thread extends uninterrupted and taut from the cop of thread below (not shown) to reel 14 which is full of wound thread and being unloaded as shown in Figure 1. Thread 7 is held by gripper element 20 the end of which is in the form of a hook and the said thread 7 is also positioned by the end of movable portion of sheeting 15. Curved lever 6 pushes against bobbin 1. In the next stage arm 8 is activated to rotate angularly around pin 21 to place bobbin 1 between the centres of reel-carrier mandrel 22. The said rotation is brought about by known means housed in carriage 5. In the said angular rotation bobbin 1 interferes with taut thread 7 which partly winds round it along a circumferential sector when the bobbin is positioned and gripped between the centres of mandrel 22 (see Figure 2).

At the same time or in sequence with the rotation of arm 8 movable sheeting 15 is lowered. Curved lever 6, remaining with its essentially flat end in contact with the surface of bobbin 1, keeps roller 3 at a slight distance from the said surface of bobbin 1. In the next stage, on placing and gripping bobbin 1 between the centres of mandrel 22, the angular movement of rod-shaped element 10 and the axial movement of hooked gripper element 20 is activated at the same time. The said movements are illustrated schematically in front view in Figure 3 and more precisely, the rod element moves from position 10a to position 10 and the hooked gripper element moves from position 20a to position 20; this is to force thread 7 to move from position 7a to position 7. In this last position thread 7 winds round roller 3. Incidentally, the above-mentioned movements are activated by actuator 16. In the stage after the above-described movements the end of arm 8 finally leaves bobbin 1, already fixed to mandrel 22, and moves angularly upwards. This slight angular rotation causes curved lever 6 to rotate round pin 12 pushed by coiled spring 9 which forces the said lever 6 to remain pressed against the surface of bobbin 1.

Due to the effect of the said angular rotation

the contact of lever 6 shifts from its flat end to roller 3 fixed freely to it.

Thread 7 winds round bobbin 1 around a considerable circumferential arc and is pressed tightly against the surface of bobbin 1 by roller 3 (see Figure 4). Partly overlapping this latter operating stage cutter element 2 is activated by acuator 16 and its rod 18. Thread 7 is cut thus releasing reel 14 which is recovered by a conveyor belt (not shown). In the next stage friction wheel 23 is brought close to one end of mandrel 22 and is made to rotate, by known means, to impart a few rotations to bobbin 1 so that the first coils of thread 7 wind onto it (see Fig. 5). The hookup and start of depositing the first coils of wound thread occurs with assured reliability since the initial end of the thread is held and, with maximum safety, brought close to the surface of bobbin 1 by free roller 3. The said initial windings hook on and secure themselves to the surface of bobbin 1 in an axial section inside the reel that will start to form with windings of criss-cross thread in the spooler.

On completing the above-mentioned initial depositing operation friction wheel 23 rises releasing its contact with mandrel 22 and elements 8, 16, 10 together with their operating means reposition themselves inside lifting carriage 5. The cycle for changing reel 14 is thus completed and the device covered by the present invention may be moved to another spooler by movable carriage 5.

The above-described embodiment has been given by way of example and in no way limits the invention.

Variants, modifications and additions may of course be made by experts within the field to the details of the device without going beyond the general concept of the present invention.

Claims

1. A device which enables the initial extremity or end of thread to be anchored to the surface of the winding bobbin on which the reel is being formed characterised in that it has in reciprocal co-operation and co-ordination:

- an arm which picks up, holds and places the bobbin between the centres of the reel-holder mandrel and the said arm also supports a curved lever which rests initially, with its essentially flat end, against the surface of the bobbin and subsequently, after securing the bobbin between the centres, the said lever rests pushing against the surface of the bobbin with a roller fixed freely close to its essentially flat end and the said roller holds the thread tightly against the circumfer-

- ential surface of the bobbin at a point inside the reel being formed and for the entire time required to wind on the first coils of wound thread;
- a linkage which has a gripper element, a cutter element and a rod-shaped element for moving the thread underneath the above-mentioned roller and to the thread anchorage point, or section, and start of winding point on the bobbin to form the reel, as the package of thread to be obtained.
2. A device according to Claim 1, characterised in that the lever supported by the arm is pushed against the surface of the bobbin by an elastic element, such as a spiral spring fitted round the rotation pin of the said lever.
3. A device according to Claim 1, characterised in that the point of starting anchorage of the thread onto the surface of the bobbin is located in the section of axial length of the reel, i.e. in the axial section inside the reel being formed.
4. A device according to Claim 1, characterised in that it is housed in a carriage that moves along the entire winding front.

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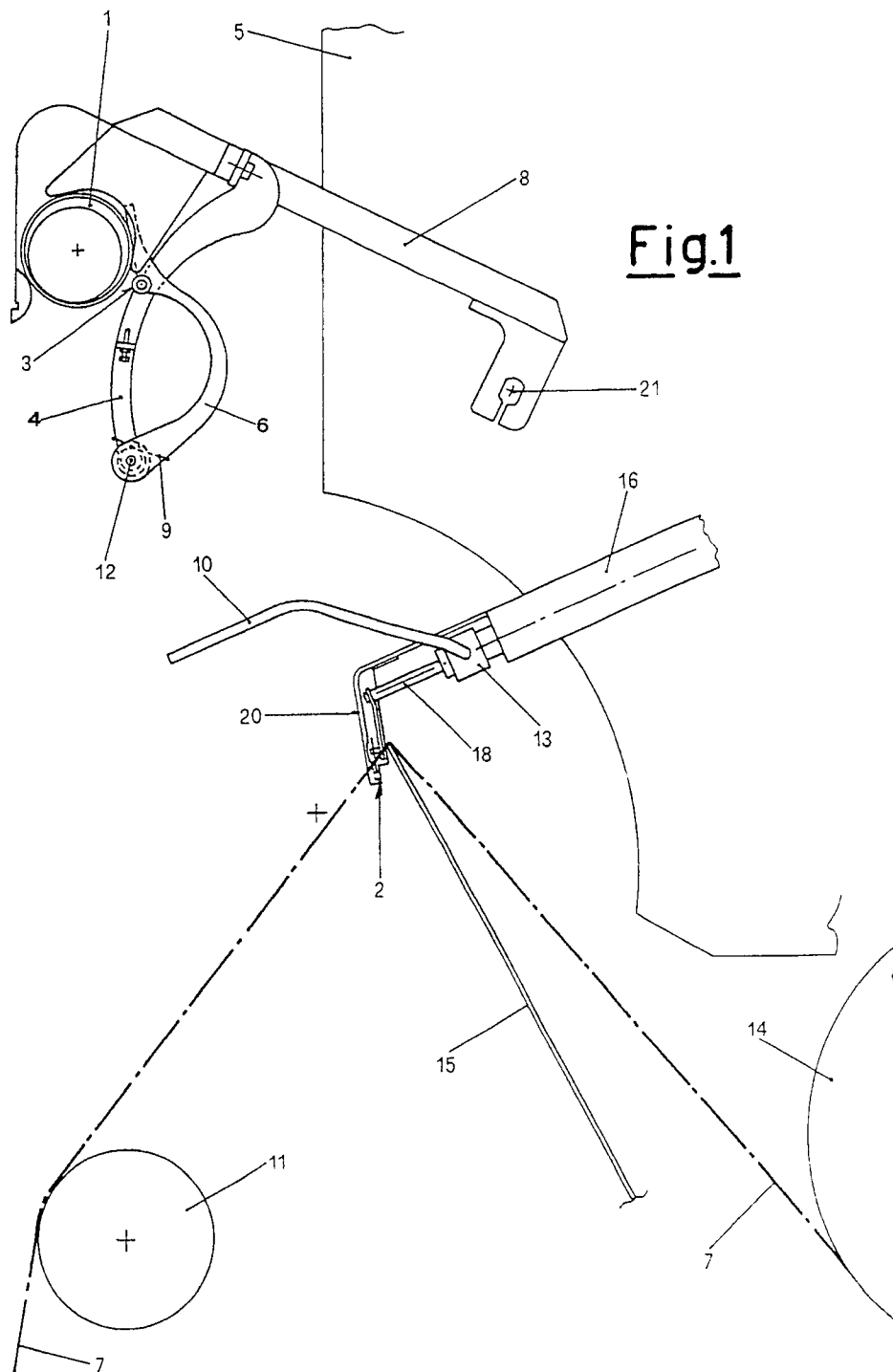


Fig.2

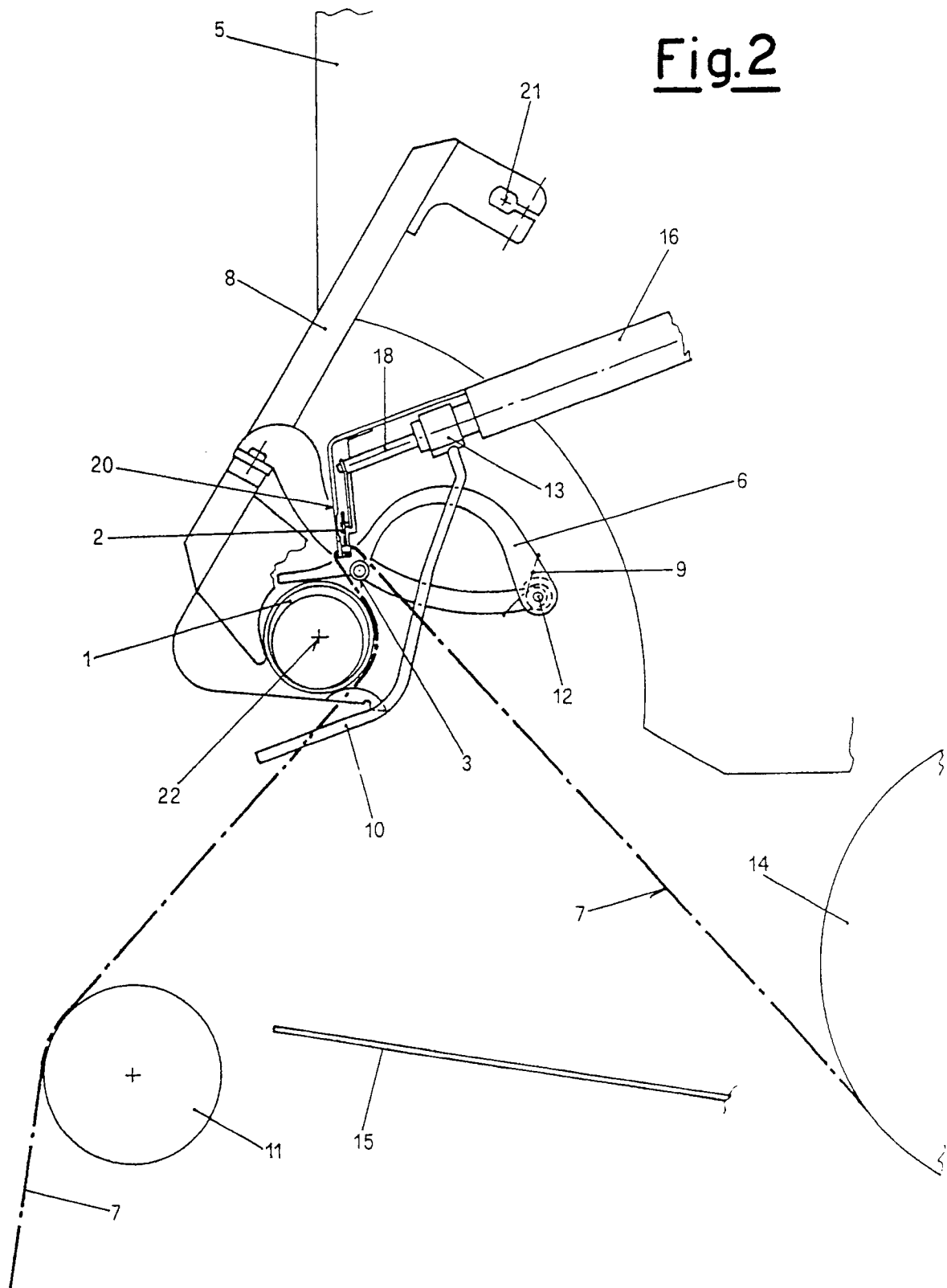


Fig.3

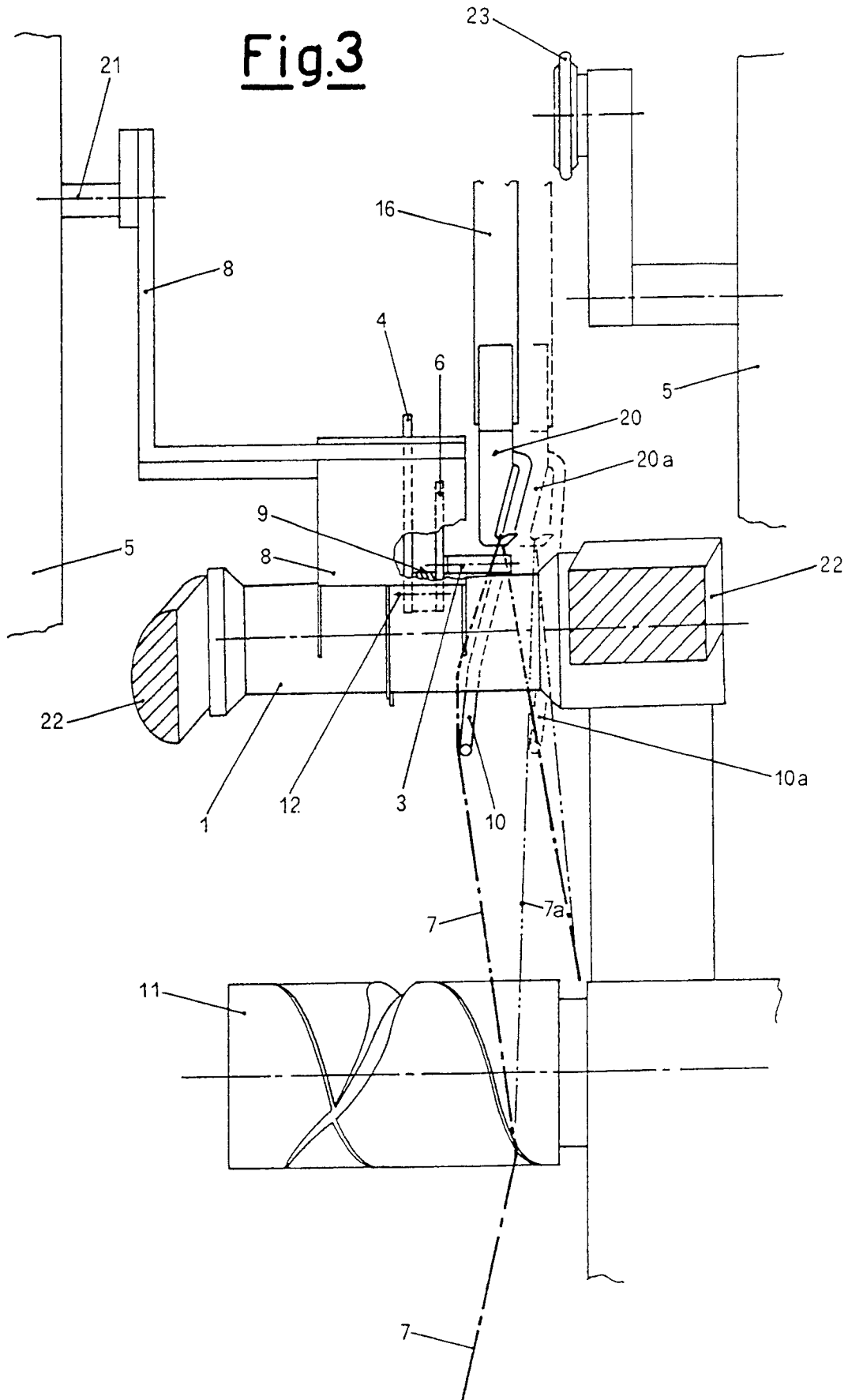


Fig.4

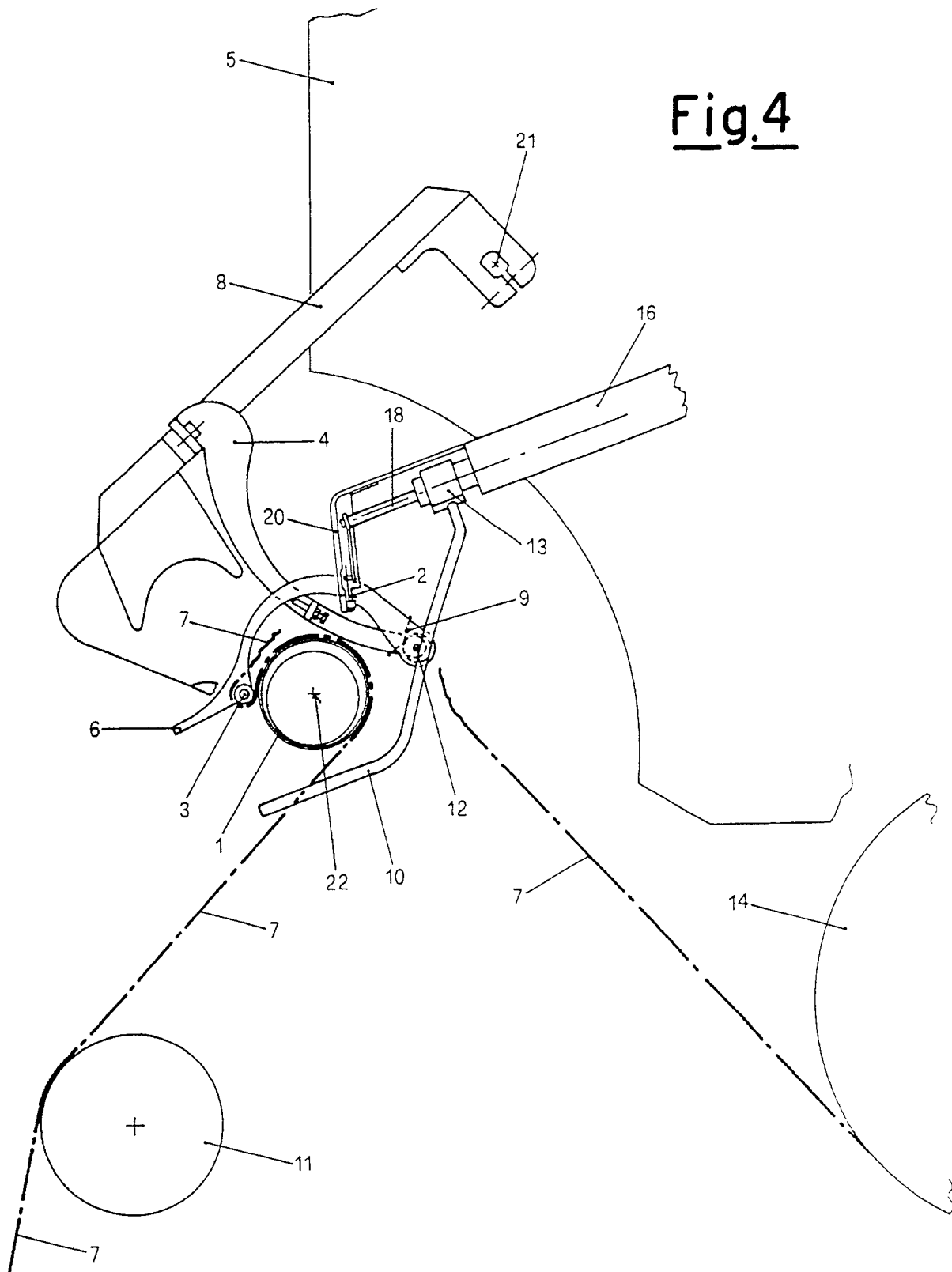


Fig.5

