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(54) Improvements to carding process.

(57) A method of handling slubbings in the woollen process comprises positioning a curved flume 24 in the path of the some or each slubbing 14 and passing the slubbing along the flume 24 to create a stress or tension therein. The stress or tension compacts the slubbing and enables it to be wound on a spool 12 in a very much more compact form than was hitherto possible. The flume 24 is easy to thread up and the tension is continuously variable to meet specific conditions.

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IMPROVEMENTS TO CARDING PROCESS

The present invention relates generally to the manufacture of spun yarns by the woollen system and more particularly relates to a woollen carding process and the production of denser spools of woollen slubbings or slivers.

In conventional processing the raw material or blend of staple fibres is carded with the objects of disentangling the fibres from each other, freeing dirt, vegetable matter and other unwanted contaminants, improving the mixing of fibres, particularly when more than one fibre type is included in the blend, evening out the flow of material to produce a web of fibres as uniform as possible in density, and finally splitting the web into parallel ribbons, consolidating those ribbons into slubbings, slivers and rubbing them between two oscillating surfaces, and winding the slubbings into packages suitable for spinning. The raw material may consist of 100% wool or other natural fibre, blends of natural fibres with man-made or synthetic fibres, or 100% synthetic fibres. However, irrespective of the raw material processed such a process is commonly known as the woollen process by historical tradition.

Slubbings are normally wound on to spools, empty spools being creeled on the card relative to a series of guides which ensure that the slubbings are wound side by side on the spools in an orderly fashion. The spools are creeled on the card such that they rest on driven rollers which in turn drive the spools by frictional contact to effect winding. In conventional practice several ends of slubbing are wound on to one spool, and a regular traverse oscillation is provided between the spools and the slubbing guides such that 'cheeses' of slubbing are wound. The number of cheeses of slubbing wound on to each spool varies according to the gauge of the spinning machine on which the yarn is to be spun and is thus governed largely by the count of the yarn.

Slubbings are produced and wound on the card as soft twistless strands having low tensile strength. Some tensile strength is derived from interfibre entanglements and consolidation of the fibres assembly in the rubbing process and this strength is sufficient to enable winding of the slubbings at a low tension draft of about 6% without irregularly stretching the slubbings or in any way reducing their evenness. Thus spools of slubbings tend to be soft with the density in the material of the order of 0.15 g/cc, depending on the raw material being processed. This low density of material limits the amount of slubbing which can be wound on a full spool of reasonable and acceptable diameter. Spools of woollen slubbings are handled at the card and again at the spinning frame, and in practice spool-related tasks form a high proportion of the total labour requirement in both carding and spinning. The material capacity of the spool thus has a limiting effect on the economic efficiencies of both the carding process and the spinning process.

European patent publication 0181697 discloses a method of handling slubbings in the woollen process which includes positioning one or more finger guides in the path of the same number of slubbings, and wrapping a slubbing round each finger guide to thereby create a stress or tension therein before the slubbings are directed for further processing.

This method has been found to work generally very well except for two disadvantages. The first is that jenning up of the finger guides either at the start of the process or after an end breakage is tricky and therefore slows down the production of slubbings. Secondly, with a given finger guide tension is only adjustable in steps according to the number of wraps of slubbing around the guide.

The invention seeks to provide a method and apparatus for winding slubbings tightly improved in the above respects.

According to the present invention there is provided a method of handling slubbings in the woollen process which comprises positioning a curved flume in the path of the some or each slubbing and passing the slubbing along the flume thereby to create a stress or tension therein before the slubbings are directed for further processing.

The curved flume will be generally V-shaped in section and positioned in the vicinity of the condenser drum and condenser bobbin or spool of a woollen card with one end of the flume being close to the nip between the condenser drum and bobbin. The or each slubbing passing from the condenser rubbing apron of the card passes through an associated flume where tension is created by the frictional engagement between the slubbing and the flume. The point at which the slubbing enters the flume, and thereby the amount of tension created in the slubbing, may be varied continuously by means of a variable slubbing guide.

It has been found that in the method of the invention a satisfactorily dense and compact spool of slubbing can be built up on the condenser bobbin but in order to achieve this some modifications need to be made to the normal arrangement.

It is important that the distance from the end of the flume closest to the nip between the condenser drum and the spool be kept substantially constant as the bobbin fills to thereby avoid the possibility of yarn property variations within the bobbin. This

is achieved by modifying the standard track of the bobbin so that the nip remains in the same place as the bobbin fills. It has also been found that the raddle traverse for winding the slubbing on the spool, which is normally a simple harmonic motion controlled by an offset cam or pin, requires modification since the slowing down of the normal motion at each end of the traverse causes a concave package to be formed. The raddle cam in the method of the invention is therefore preferably modified to a cardioid cam giving substantially constant speed of movement over the bulk of the traverse combined with rapid deceleration and acceleration at each end.

The invention will be described further, by way of example, with reference to the accompanying drawings, in which:

Figure I is a diagrammatic view of a woollen card modified in accordance with the invention;

Figure 2 is a similar view to figure I from the other side;

Figure 3 is a diagrammatic view of the raddle traverse mechanism; and

Figure 4 is a diagrammatic perspective view of another embodiment.

Referring to the drawings, a standard woollen card comprises a condenser drum I0 and associated condenser take-up spool or bobbin I2. Slubbing I4 is fed from condenser rubbing aprons I6 in the normal way. As the slubbing I4 winds on the bobbin I2 its effective diameter increases and, in order to keep the nip I8 between the condenser drum I0 and the bobbin I2 in a constant position, the axis of rotation 20 of the bobbin is arranged to run on an inclined track 22 positioned so as to achieve this end.

In accordance with the invention a curved flume 24 is located on the card raddle shaft 26 in the region of the condenser drum I0, the distal end 28 of which flume is located at a short distance 'D' from the nip I8. The flume is generally 'V' shaped in section over the bulk of its length but may have a further constriction illustrated in figure I at 30 adjacent its distal end 28.

The slubbing I4 is led into the flume 24 by means of a slubbing guide 32 whose position is adjustable so as to change the length of travel of the slubbing I4 within the flume 24 and thereby the tension created in the slubbing.

In use, the slubbing I4 is led through the guide 32 into the flume 24 and thence to the nip I8 where it is taken up on the bobbin I2. The differential speed between the condenser drum and take up spool on the one hand and the condenser rubbing aprons on the other causes the slubbing I4 to pull against the arcuate surface of the flume. The frictional contact in turn creates the tension within the slubbing and causes it to exit from the distal end 28 of the flume in a compacted form. Adjustment of the guide 32 varies the length of the flume in contact with the slubbing and thereby the degree of tension and degree of compactness created in the slubbing. It has been found that in order to avoid variations in the property of a finished yarn the distance D should be kept constant and this is achieved as discussed above by arranging the track 22 so that the axis 20 of the gradually filling bobbin I2 moves away from the nip I8 in a direction normal to the circumference of the condenser drum at the point.

The flume 24 is connected to the raddle shaft 26 which is caused to traverse by a mechanism described best by reference to figure 3. In this, the standard raddle traverse cam is replaced by a cardioid cam 32 driving a cam follower 34 pivotted at one end 36 to the framework of the card. The cam follower 34 includes a slot within which is located a pin 38 of a traverse follower member 40 attached to one end of the raddle shaft at 42.

The cam 32 ensures that the raddle traverse motion has substantially constant speed over the greater part of its travel, rapidly decelerating and then accelerating again at the reversal points at each end of the traverse. The length of traverse can be adjusted by adjusting the traverse follower 40 by means of the attachment 42. Moving the traverse follower 40 to the right as viewed in figure 3 shortens the raddle traverse and vice versa.

The apparatus of the invention incorporates a self adjusting facility. The slubbing travels over the arcuate flume which has a restriction 30 at its delivery end 28. The effect of the restriction is to present a more condensed slubbing to the take up spool I2 increasing its tensile strength and avoiding breakages. The frictional drive on the remainder of the slubbing I4 and contact with the flume 24 is created by the speed differential between the rubbing apron I6 and the take-up spool I2 in effect trying to straighten out the slubbing I4 over the arcuate section of the flume 24. Should the slubbing I4 between the rubbing apron I6 and condensing zone become slack, then the friction round the flume 24 will reduce allowing the take-up spool I2 to absorb the slack. Furthermore, the frictional adjustment, by means of the slubbing guide 32, is in effect infinitely variable by applying more or less slubbing to the surface of the flume 24.

Referring now to figure 4, in this embodiment the flumes 24 are formed by pressing or moulding from a continuous sheet 44 fixed to the raddle shaft 26 as before. One advantage of this configuration, apart from ease of manufacture, is that it aids threading up of broken slubbings since the free ends are retained on the sheet. Furthermore, should a slubbing accidentally move from its flume

24 it will be retained on the sheet 44 rather than get tangled up in the machinery and it will tend to move back into its proper flume 24 as the sheet is traversed.

The apparatus of the invention is considerably easier to thread up than the fingers of European patent publication 0181697 and furthermore provides continuous adjustment of tension. It thus provides the benefits of that apparatus without the disadvantages.

Claims

1. A method of handling slubbings in the woollen process which comprises positioning a curved flume in the path of the some or each slubbing and passing the slubbing along the flume thereby to create a stress tension therein before the slubbings are directed for further processing.

2. A method as claimed in claim 1 in which the curved flume is generally V-shaped in section.

3. A method as claimed in claims 1 or 2 in which the flume is positioned in the vicinity of the condenser drum and the condenser bobbin or spool of a woollen card with one end of the flume being close to the nip between the condenser drum and bobbin.

4. A method as claimed in any one of claims 1 to 3 in which the point at which the slubbing enters the flume and thereby the amount of tension created in the slubbing is varied by means of a variable slubbing guide.

5. A method as claimed in any of claims 1 to 4 in which the distance from the end of the flume closest to the nip between the condenser drum and the spool is kept substantially constant as the bobbin fills.

6. A method as claimed in claim 5 in which the standard track of the bobbin is modified so that the nip remains in the same place as the bobbin fills.

7. A method as claimed in any of claims 1 to 6 in which the raddle traverse for winding the slubbing on the spool is modified so as to give substantially constant speed of movement over the bulk of the traverse combined with rapid deceleration and acceleration at each end.

8. A method as claimed in any of claims 1 to 7 in which the or each flume is formed as a depression in a continuous sheet of material.

Fig.1.

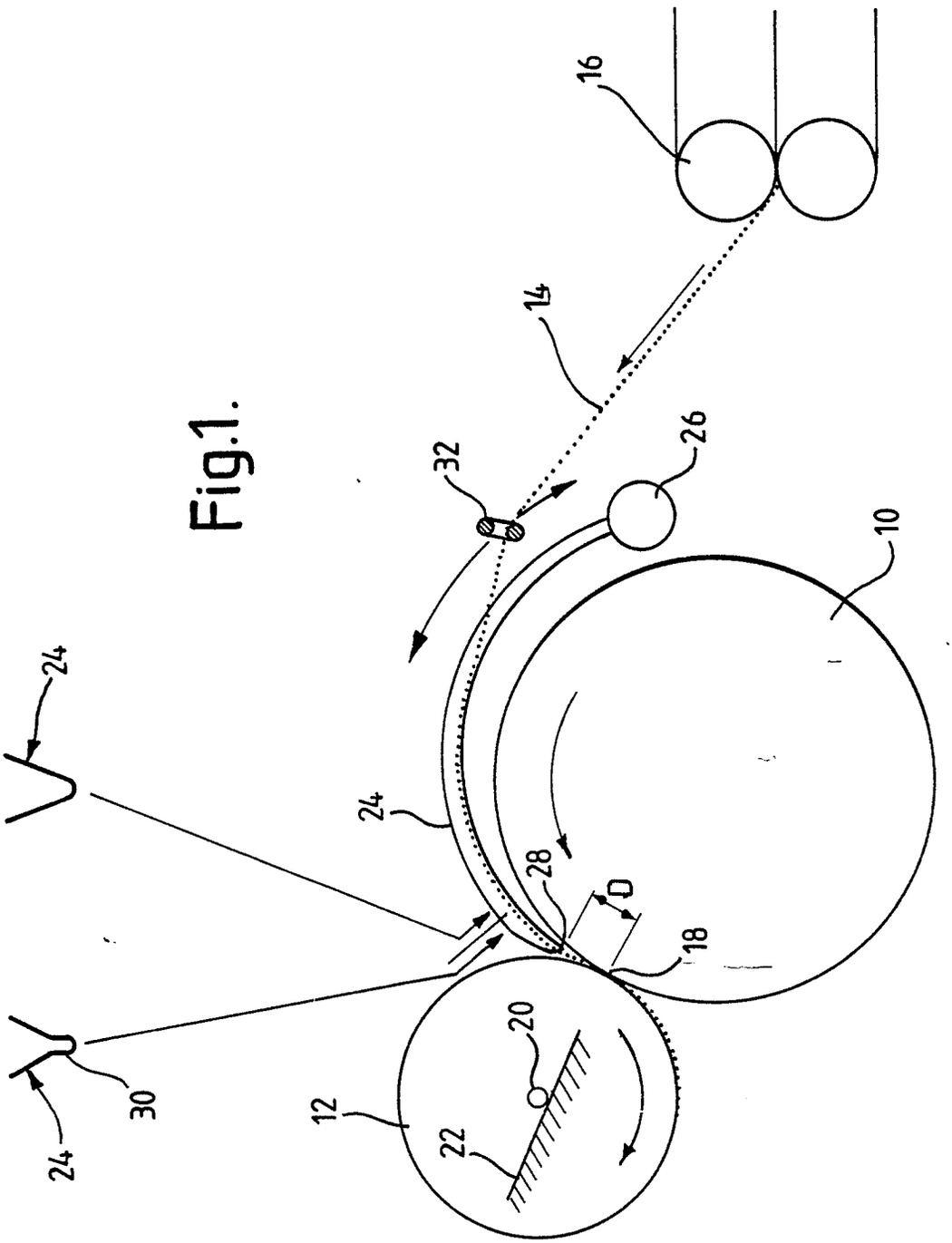


Fig.2.

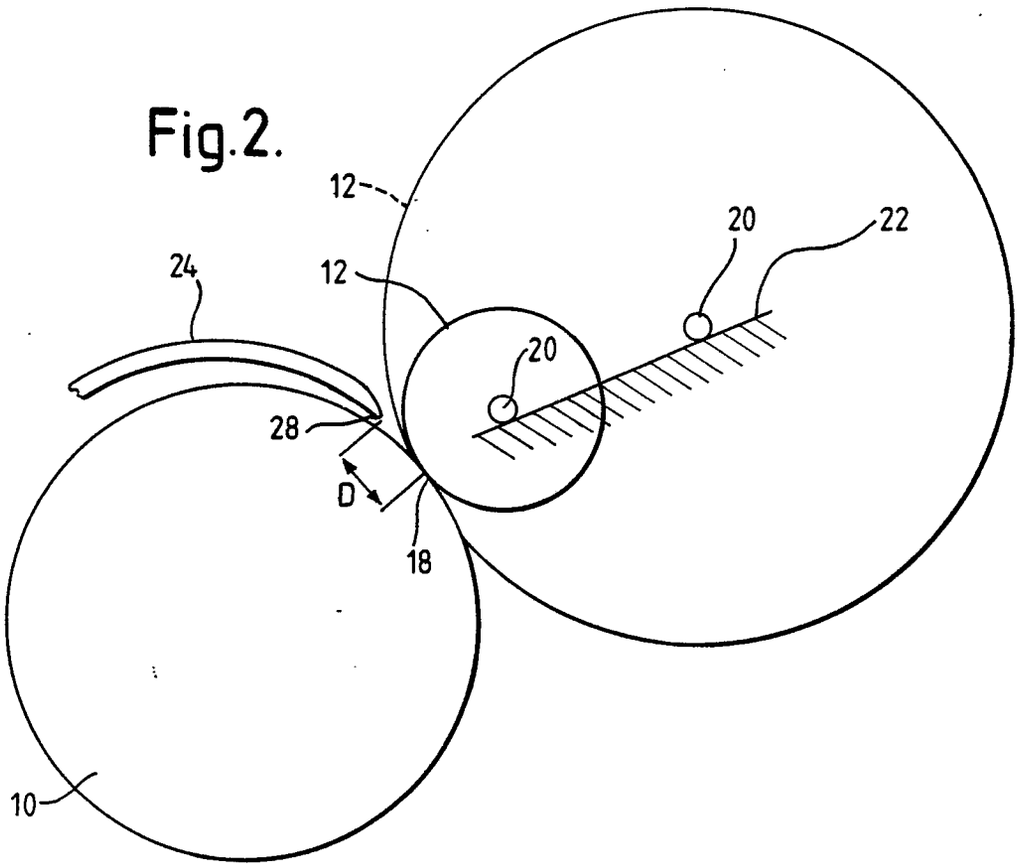
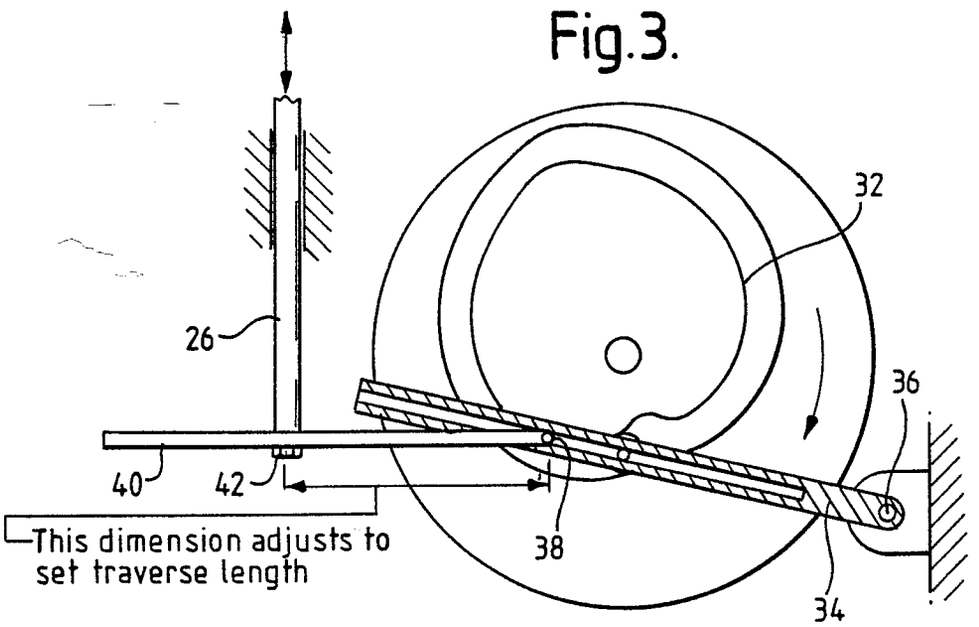

12
20
22
24
12
20
28
D
18
10

Fig.3.


32
26
36
40
42
38
34
This dimension adjusts to set traverse length

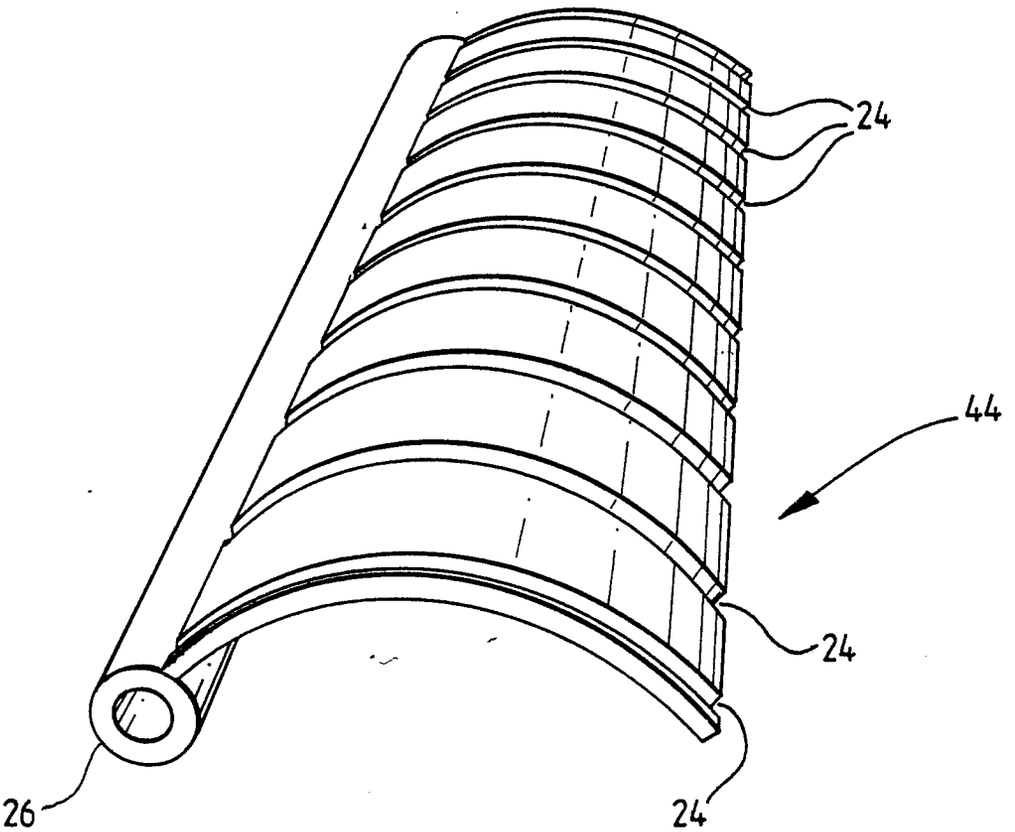


Fig.4.