

April 2, 1963

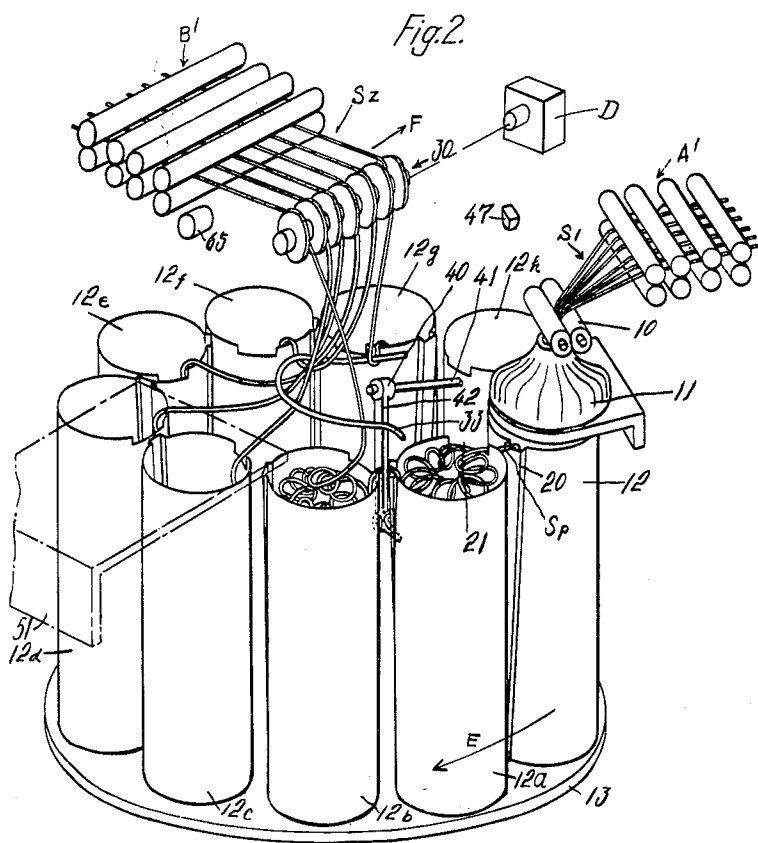
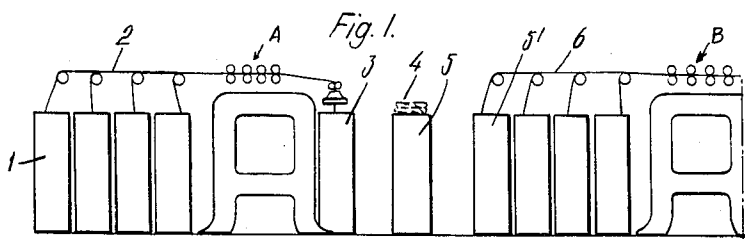
IWAO OSAKI ETAL

3,083,415

SLIVER COILING

Filed Aug. 16, 1961

6 Sheets-Sheet 1



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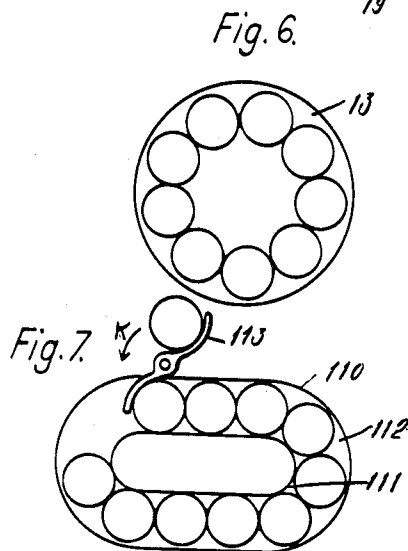
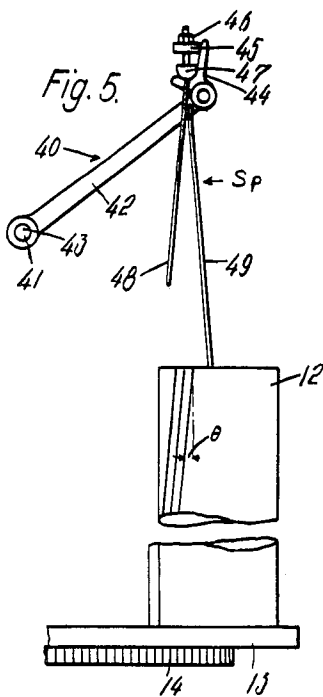
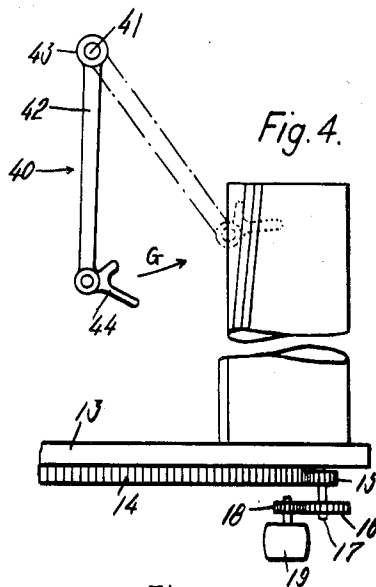
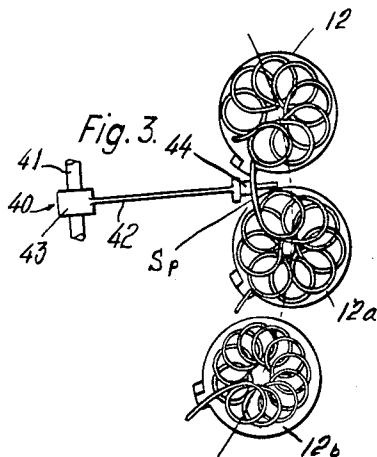
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SLIVER COILING

Filed Aug. 16, 1961

6 Sheets-Sheet 2



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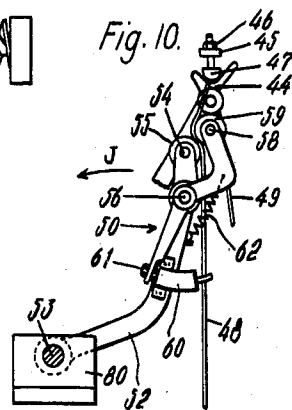
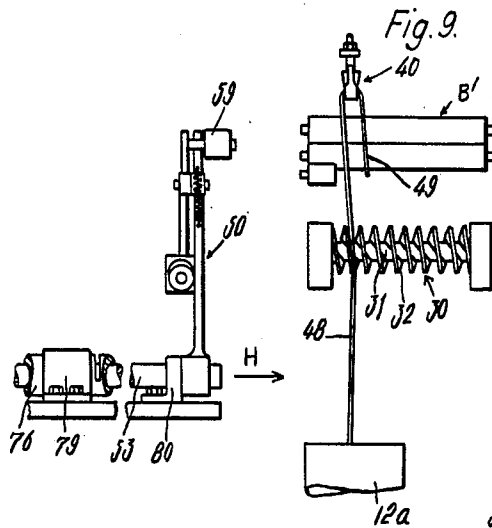
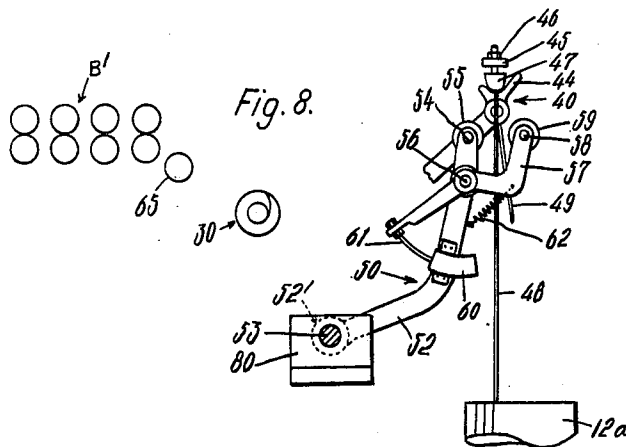
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SLIVER COILING

Filed Aug. 16, 1961

6 Sheets-Sheet 3



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3,083,415

SLIVER COILING

Filed Aug. 16, 1961

6 Sheets-Sheet 4

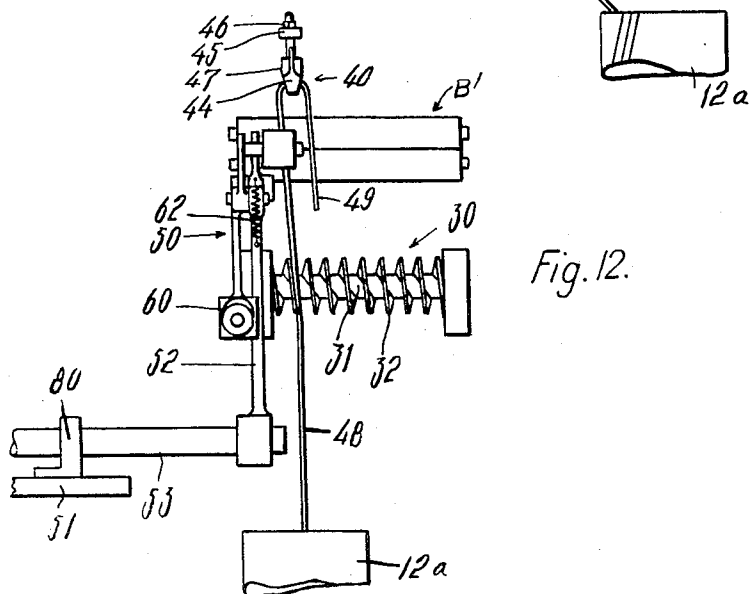
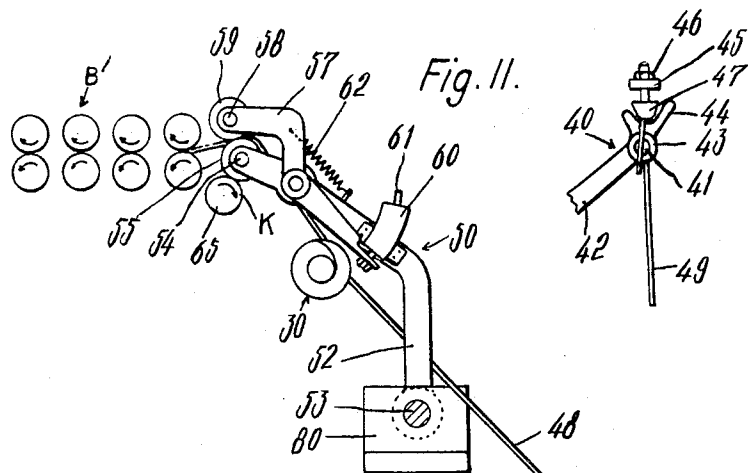


Fig. 12.

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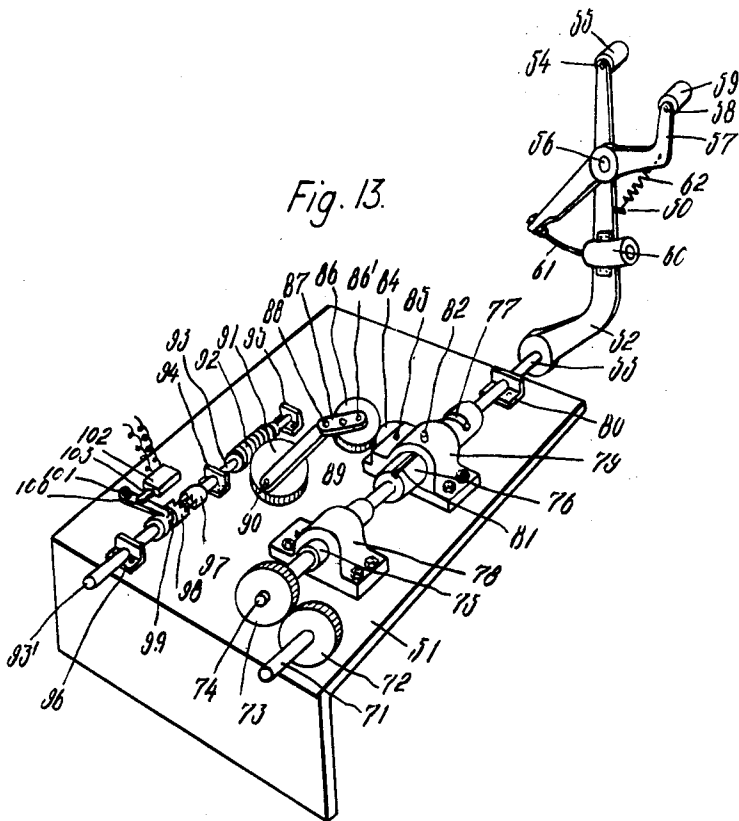
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3,083,415

SLIVER COILING

Filed Aug. 16, 1961

6 Sheets-Sheet 5



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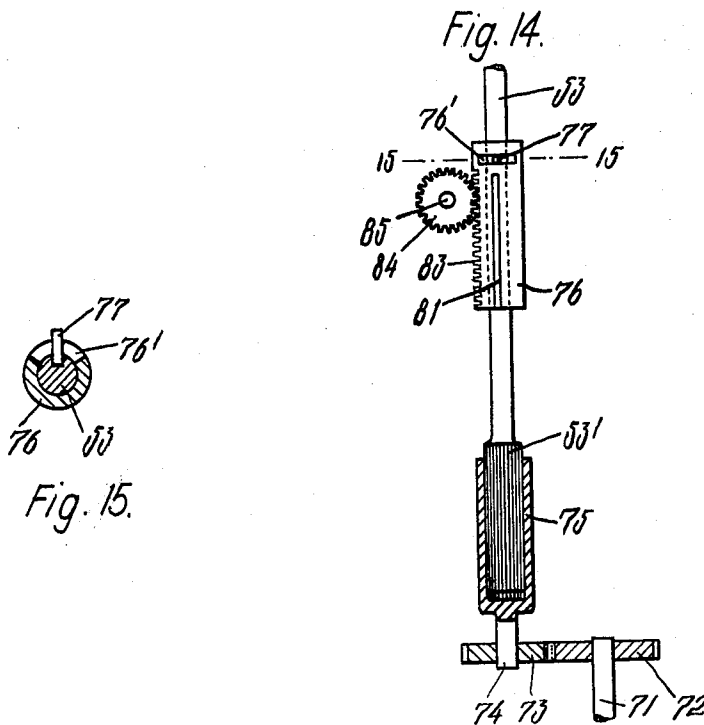
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3,083,415

SLIVER COILING

Filed Aug. 16, 1961

6 Sheets-Sheet 6



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3,083,415

SLIVER COILING

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Filed Aug. 16, 1961, Ser. No. 131,800

Claims priority, application Japan Aug. 18, 1960

8 Claims. (Cl. 19—159)

This invention relates to a novel sliver handling system in fore-spinning or preparatory spinning process, and more particularly to a sliver handling system for automatically and continually supplying slivers delivered from one drawing or drafting stage to the next drawing or drafting stage with the necessary blending or doubling effect simultaneously accomplished.

It is well known in the art that a plurality of slivers of textile fibre are processed through a series of various drawing or drafting stages to blend and draft the same into a single sliver with its fibre uniformized and oriented. In order to obtain the doubling or blending effect, it has been conventional to collect individual slivers delivered from a particular stage into a plurality of respective cans or containers successively and to manually transport thus filled cans to the next drawing stage. More typically, in conventional drawing system, it has been usual that a predetermined number (e.g. from six to eight) of cans, containing slivers delivered from a carding machine or a drawing frame are manually arranged for supply to the next drawing frame. In order to carry out this operation, it has been necessary for workers to keep watching the conditions of slivers being delivered to the cans from a drawing stage so that when any one of said cans is filled with sliver they may timely replace the same with a fresh empty can. The cans thus filled must be manually transported to the next drawing stage, where it is also necessary for workers to see that the slivers are being continuously fed to said next drawing stage so as to manually replace a can, when exhausted, with a filled one. The above mentioned operation apparently requires a large number of workers and payment of their close and continued attention.

The present invention provides a novel system for automatically and continually transferring and supplying slivers from any drawing frame to the next drawing frame while maintaining the doubling or blending effect without requiring any manual operation in sharp contrast to the conventional system.

Thus, according to a preferred and typical embodiment of this invention, slivers are automatically and continually transferred and delivered from one drawing frame to another drawing frame with the necessary blending or doubling effect simultaneously accomplished, by connecting one drawing frame to another or the next drawing frame in a novel manner whereby not only the exchange, transfer and positioning of cans or containers but also feeding of slivers that have been heretofore carried out manually by workers are effected automatically and continually without sacrificing the effect of blending or doubling.

This is achieved by arranging a predetermined number of cans or containers in an endless series, for example, in a circular arrangement between the two drawing frames. It is so arranged that the aforesaid cans or containers are charged in succession with continuous slivers by the preceding drawing frame with no cutting-off of slivers involved. In other words, a whole group of containers are intermittently moved as a unit by a suitable drive mechanism so that when one of the containers becomes substantially full of sliver the next or

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following empty container is moved into the sliver charging position vacated by the preceding container so as to permit the sliver to be continuously delivered to said empty container. Meanwhile, the slivers (for instance, six slivers) from a given number of already charged containers (six containers) are supplied to the succeeding drawing frame. The sliver content in the containers is gradually less from the newly charged one toward the foremost one. More particularly, the amount of sliver in one of such containers is always larger than the amount of sliver in the preceding container. The intermittent drive mechanism mentioned above is so controlled as to be actuated substantially at the same time when the foremost one or oldest one (that is, the containers which holds the least amount of sliver at the moment) among the containers whose slivers are being charged into the next drawing frame is completely emptied. There is also provided means to guide and supply the leading end of a sliver of a fresh or full container at the moment when the said intermittent drive mechanism is actuated. Thus, an automatic and continuous sliver supply connection between the first drawing frame and the second drawing frame is accomplished.

One object of the present invention is to eliminate the manual operation which has been heretofore inevitable between two adjacent drawing frames by interconnecting them in a novel system without sacrificing the effect of doubling or blending.

Another object of the present invention is to provide a novel apparatus for accomplishing the aforementioned object.

An additional object of the present invention is to contribute toward the realization of automation in fore-spinning process.

The aforementioned and other objects and advantages of this invention will be apparent from the following description given with reference to the accompanying drawings in which:

FIG. 1 is a sketch showing a side elevation of a conventional drawing system;

FIG. 2 is a schematic perspective view of an apparatus embodying this invention with some parts thereof omitted;

FIG. 3 is a schematic plan view of device for lifting a continuous sliver extending between two adjacent containers into the supply preparatory position;

FIG. 4 is a schematic side elevation of the device shown in FIGURE 3;

FIG. 5 is a view similar to FIG. 4 but showing the sliver lifting device which has just completed the sliver lifting operation;

FIGS. 6 and 7 respectively show arrangement of containers, FIG. 6 showing that to be described hereinafter and FIG. 7 a modification thereof;

FIG. 8 is a schematic side elevation showing a means for carrying the lifted sliver to the supplying position;

FIG. 9 is a partly broken front view of FIG. 8;

FIG. 10 is a view similar to FIG. 8 but showing the sliver carrying means in advanced position for clamping the sliver;

FIG. 11 is a view similar to FIG. 10 but showing the sliver carrying means in swung position to supply the sliver to the second drawing frame;

FIG. 12 is a front view of FIG. 10;

FIG. 13 is a schematic perspective view of a mechanism for driving the sliver carrying means;

FIG. 14 is a front view, partly in section, of a main drive mechanism shown in FIG. 13; and

FIG. 15 is a cross section taken along the line 15—15 of FIG. 14.

Referring to the drawings, more particularly to FIG. 1, which shows a schematic side elevation of a typical conventional drawing system, a predetermined number of

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cans or containers 1 are placed behind a drawing frame A, through which slivers 2 are drafted into a single sliver which is discharged into a can 3.

When the can 3 is filled up with the sliver, it is removed by a worker from the drawing frame A and replaced by a new empty can. The filled can 5 is transported by a worker to the next drawing frame B where the slivers 6 from a predetermined cans 5' are drafted into a single sliver which is discharged into another can (not shown). The foregoing explanation relates to a conventional system and has been given to show the contrast thereof to the present invention which is to be described hereinafter.

Referring to FIG. 2 which schematically shows an embodiment of this invention, slivers S_1 emerged from a carding frame A' are collected in a conventional manner into a single sliver which, while being coiled by a conventional coiling means 11, is delivered or discharged into a container 12 similar to a conventional can. The can 12 is arranged just below said coiling means 11 and is supported on a base plate or turntable 13 which is adapted to be driven intermittently in such a timing relation as will be described hereinafter.

Since the container 12 of this invention does not rotate by itself in contrast to the conventional one, it is preferable that a coiler of said coiling means 11 is so constructed as to perform a combination of revolution and rotation by a suitable mechanism (not shown) such as that sometimes is referred to as a planetary system.

On the turntable 13 are placed, besides said container 12, a plurality of containers 12a-12h, each identical to said container 12, in an endless series as shown. In the embodiment shown, there are nine containers arranged on the turntable 13. However the number of containers to be employed is not limited thereto, but generally determined in the following manner. Namely, to the number of the containers corresponding to the number of slivers to be supplied to the next drawing frame B' (six slivers or containers 12b-12g in the embodiment shown) is added at least three—that is at least one empty container 12h, one container 12 being supplied with the sliver from the drawing frame A' and at least one filled container 12a which is arranged between the container 12 and 12b. Since in the embodiment shown, the slivers S_2 being fed into the next drawing frame B' are shown as six, there must be provided a total of at least nine containers.

The slivers S_2 , in addition to being drawn in the direction of their length, are moved in the direction of arrow F keeping the paralleled relation by a suitable means. In the embodiment shown, a screw conveyor 30 is provided and each sliver extends transversely thereof passing between adjacent screw walls as well shown in FIG. 2. The screw conveyor 30 is continuously or intermittently rotated so that the slivers S_2 are moved on the screw conveyor toward the direction of F.

The amounts of the sliver in the containers 12a-12g are gradual from 12a to 12g so that the content of the container 12a is the largest and that of the container 12g is smallest. It will be understood, therefore, that the foremost one of the container 12g will be first emptied or exhausted.

It is so arranged in timing relation that, as the drawing operation proceeds, substantially spontaneously with the moment when the container 12g is completely emptied, in other words, at the moment when the number of the slivers S_2 is reduced from six to five, the container 12 which is being charged is full of the slivers S_1 from the drafting frame A'. As soon as the container 12 is filled, the turntable 13 is turned a pitch corresponding to a single container in the direction of arrow E so that the filled container 12 is advanced out of the coiling means 11 and the following empty container 12h is brought into the position just vacated by the container 12. Thus the sliver

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S_1 is supplied without interruption to the new container 12h from the preceding drawing frame A'.

Upon the turning of the turntable 13, a sliver lifting device 40 is actuated to take up a portion Sp of the sliver extending from the container 12a to the container 12, and a sliver carrying means 50 (FIGS. 8, 9, 10, 11, 12 and 14) is also actuated to clamp the sliver portion Sp thus taken up or lifted and to carry and supply the same to the drawing from B', thereby supplementing the loss in the number of slivers S_2 . This operation and a mechanism for carrying out the same will be described in detail hereinafter.

In order to intermittently drive the turntable 13 in the aforementioned timing relation, there is rigidly mounted on the shaft of a driving motor 19 (FIG. 4) a gear 18 that is in mesh with a gear 16 secured to one end of a shaft 17 supported in a suitable manner, the other end of said shaft 17 being fitted with a gear 15 in mesh with a gear 14 of a larger diameter mounted rigidly on said turntable 13. The gearing forms a reduction system, and it is so arranged that a switch mechanism (not shown) associated for example to a calender roller 10 of FIG. 2 is actuated each time the calender rollers 10 have completed a given number of revolutions (or a substantially predetermined amount of the sliver has been discharged into the container 12 to fill the same). The driving motor 19 is energized by said switch so that the turn table is rotated through a given angle (or one pitch corresponding to one container).

As shown in FIG. 2, each of the containers used in the system of this invention is provided with a longitudinal projected groove 20 throughout the length of the shell and a recess 21 at the upper edge of the container. The containers are so positioned that the groove of a container confronts the recess on the adjacent container in the manner as shown. The provision of said groove 20 and recess 21 serves to guide the sliver in good position between the adjacent containers. In the system of this invention, when a container becomes full of sliver and another container in turn is about to be charged with sliver, the last end of sliver in the first container (i.e. a container which has become full of sliver) continuously extends therefrom into the next empty container, or in other words bridges over the two containers, in contrast to a conventional system in which the sliver is cut off by hand and the resulting end of sliver is manually inserted into an empty can. Thus in the system of this invention, the sliver portion Sp so formed must be held in a good position that is convenient for the succeeding sliver lifting operation.

The groove 20 also serves to provide a place of refuge for the sliver leading portion fed at the beginning of charge into an empty container so that the said sliver leading portion may not disturb the subsequently fed sliver in the coiled form. In this connection, due to the rotational movement of the coiler of the coiling means 11, it has been found preferable to arrange the groove 20 at a small angle θ (for example, about 18°) as shown in FIG. 5.

The operation and structure of the sliver lifting means 40 will now be described. This means 40 comprises a shaft 41 rotatably supported by a suitable bracket or the like (not shown) and an arm 42 secured to said shaft at its end boss 43. The said arm 42 is located in a central space defined and surrounded by containers 12-12h so as to be accessible to the sliver portion Sp as shown in FIG. 2. The said apparatus 40 is not supported by the turntable 13 so that it is not influenced by the intermittent movement of the turntable.

As shown in FIG. 4, the arm 42 normally is in a non-operative position indicated with the solid line, but upon each turning of the turntable by the motor 19 through gears 18, 17, 16, 15 and 14, the arm 42 is swung upwardly through a predetermined angle by the shaft 41 in

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the direction of arrow G through a position indicated with a dotted line (FIG. 4) so as to take up and lift the sliver portion *Sp* extending between the container 12 which has by now become full of sliver and the preceding container 12*a* which has previously been filled.

It will be understood that the angular turning of the shaft 41 can be readily effected by a suitable driving means (not shown) to be actuated by a suitable timing mechanism. Thus, when the arm 42 swings, a hook 44 provided or formed at an end thereof catches or takes up the sliver portion *Sp*, whereupon the sliver in the container 12*a* of FIG. 3 is decoiled and at the same time raised upward as shown in FIG. 5. In this connection, it will be understood that the portion 48 (of the sliver portion *Sp*) extending into the container 12*a* is leading directly to the topmost part of the sliver in the container 12*a* so that it is readily decoiled, while the sliver in the container 12 leading directly to the other portion 49 of the sliver portion *Sp* is not decoiled since it is directly extended into the bottom of the container 12.

Referring to FIG. 5, in the path of swinging of the hook 44 of the arm 42 there is provided a flexible member 47 made preferably of rubber or similar material. The contour of the member 47 is adapted to fit the inner edge of the hook 44 and is secured to the tip of a screw 46 adjustably threaded through a stationary bracket 45. By this arrangement the sliver portion *Sp* raised by the lifting means 40 is clamped between the flexible member 47 and the hook 44, whereby the step preparatory to the subsequent sliver cutting operation and automatic sliver carrying to the next drawing frame is completed.

It will be understood that the sliver 49 shown in FIGS. 8, 9, 10, 11 and 12 extends into the container 12 which has been omitted for simplification of illustration. Similarly the sliver 48 shown in FIGS. 5 and 10 extends into the container 12*a* which has been omitted.

Sliver carrying and feeding means 50 will now be described below. The sliver carrying means 50 is adapted to automatically cut off the sliver which has been raised and clamped between the members 44 and 47 as described before and carry the leading end of the sliver 48 to the next drawing frame B' for supplying thereto. A driving mechanism 70 (for said carrying means), a full description of which will be hereinafter given, is installed as shown in FIG. 13 on a platform 51 located above and sufficiently spaced from the containers as indicated with the chain line in FIG. 2 so that it will not disturb the slivers extending from the containers to the drawing frame B'.

Referring to FIG. 8, the sliver carrying means 50 comprises a swing arm 52, one or lower end of said arm being secured by a boss 52' to a shaft 53 which is first advanced for a predetermined angle about its axis by the driving mechanism 70 in a particular manner as hereinafter described. The swing arm 52 is equipped at the other or upper end with a roller 55 which can turn about a pin 54 and with an arm 57 which is pivoted at its middle on the upper portion of said swing arm 52 by means of a pin 56, while the arm 57 is equipped at its upper end with a roller 59 which is rotatably mounted about a pin 58 to cooperate with the roller 55. Secured at the other end of the arm 57 is an arcuate bar 61 which is adapted to cooperate with an electromagnet 60 which is mounted on the swing arm 52 and connected to a suitable electric source through a suitable time switch (not shown). A spring 62 is interposed or connected between the swing arm 52 and the arm 57 so that normally the rollers 55 and 59 are kept away from each other to permit the insertion of the sliver portion 48 therebetween when the shaft 53 (and hence the sliver carrying means 50) is advanced. The bar 61 and the magnet 60 are so operatively related that when the electromagnet 60 is energized the bar is attracted thereto against the force of the spring 62 and the rollers 55 and 59 are moved toward each other to clamp the sliver 48 therebetween.

As shown in FIG. 9 which is an elevation of FIG. 8,

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until the sliver portion *Sp* has been completely lifted and clamped between the members 44 and 47, the sliver carrying means 50 is in its normal or non-operative position away from the sliver lifting device. However, upon the completion of lifting and clamping of the sliver *Sp* as described hereinbefore, the sliver carrying means 50 is caused by the driving mechanism 70 to advance for a predetermined distance in the direction of arrow H (FIG. 9) toward the sliver lifting device 40 and to a position where the sliver portion 48 directly extending from the container 12*a* is inserted just between the rollers 55 and 59.

It is so arranged that upon completion of the advancement of the sliver carrying means 50 the switch for the electromagnet 60 is actuated to energize said electromagnet, to which the bar 61 is drawn accordingly. Consequently the arm 57 turns or swings about the pin 56 against the force of the spring 62 with the result that the rollers 55 and 59 are moved toward each other to clamp the sliver portion 48 therebetween as shown in FIG. 10.

Upon completion of this sliver clamping operation, the driving mechanism 70 causes the shaft 53 to turn through a predetermined angle (for example, about 45°) about its axis so that the arm 52 attached to said shaft 53 correspondingly turns or swings in the direction of arrow J (FIG. 10) and to the sliver supply position shown in FIG. 11, with the sliver 48 clamped between the rollers 55, 59.

As the arm 52 or the sliver carrying means 50 so swings, the sliver portion 48 is severed from the sliver portion 49 and is brought to the supply position shown in FIG. 11 through a groove of the screw conveyor 30.

In this supply position (FIG. 11), the roller 55, which together with the roller 59 clamps the sliver portion 48, comes in contact with a friction roller 65 which is provided at the entrance to the drawing frame B' and driven positively in the direction of arrow K as shown in FIG. 11, whereupon the rollers 55 and 59 are caused to frictionally rotate so as to deliver the leading end of the sliver portion 48 into the nip of paired upper and bottom drawing rollers of the drawing frame B'. Thus the supply of the sliver 48 from the container 12*a* to the drawing frame B' is completed.

Upon completion of this sliver supply, the electromagnet 60 is deenergized so that the arm 57 is moved away from the arm 52 due to the force of the spring 62 and therefore the rollers 55 and 59 are moved away from each other to release the sliver 48. Immediately thereafter, the shaft 53 is retreated so that the sliver carrying means 50 is caused to move in the direction counter to the arrow H (FIG. 9). Then the shaft 53 reversely turns so that the sliver carrying means 50 is caused to swing back in the direction counter to the arrow J (FIG. 10) and to the original non-operative position.

Meanwhile, after the sliver 48 is severed from the sliver 49 in a manner mentioned before, the shaft 41 is turned reversely so that the arm 42 swings downwardly and the hook 44 thereon is disengaged from the member 47 to release the sliver portion 49 which falls by its weight downwardly to the container 12.

The details of the driving mechanism 70 for driving the sliver carrying means 50 in the aforementioned manner will now be described with reference to FIGS. 13-15. As will be understood from the before mentioned explanation, the driving mechanism 70 has two functions, one being to advance and retreat the shaft 53 and the other being to turn the shaft in one direction and then the other for a predetermined angle.

Referring to FIGS. 13 and 14, there is provided a driving shaft 71 which is adapted to be turned in one direction and the other a predetermined angle (which corresponds to the swing stroke of the sliver carrying means 50) with a predetermined time interval. This turning may be accomplished by any suitable means such as by

a separate motor associated with a time switch (not shown).

A gear 72 mounted rigidly on the drive shaft 71 is in engagement with a gear 73 secured to a shaft 74 which has an enlarged cylindrical portion 75 which is internally splined. The shaft 53 of the sliver carrying means 50 has at its end a portion 53' which is externally splined so as to engage with the internally splined portion 75. Loosely mounted on the shaft 53 is a sleeve 76 on which is provided an opening or slot 76' through which extends a pin 77 secured to the shaft 53 as well shown in FIG. 15. As shown in FIG. 13, there are provided a bearing 78 to support the portion 75 of the shaft 74; a bearing 79 to support the sleeve 76 on the shaft 53; and a bearing 80 to support the shaft 53. To prevent the sleeve 76 from turning due to friction when the shaft 53 rotates, there is provided externally on the sleeve 76 a longitudinally extended slot 81 into which extends a stopper 82 secured to the bearing 79.

It will be understood from the above mentioned construction that when the shaft 71 is rotated the shaft 53 is caused to turn without turning the sleeve 76, whereby the sliver carrying means 50 is also made to swing as already described.

The mechanism for causing the shaft 53 to advance and retreat will now be described. From the foregoing description with respect to the construction of the sleeve 76, it will be apparent that if the sleeve 76 moves axially thereof the shaft 53 is also moved due to the engagement of the slot 76 with the pin 77 on said shaft 53. It will also be understood that the turning and axial movement of the shaft 53 can be effected independently from each other. As shown in FIGS. 13 and 14, the sleeve 76 is formed with a rack 83 which is in mesh with a gear 84 mounted rotatably on a pin 85 extending through the base of the bearing 79 (FIG. 14). Referring to FIG. 13, the gear 84 is in mesh with a gear 86 rotatably mounted on a stud 86'. Rigidly secured to the gear 86 is a swing arm 87 which is pivotally connected at 88 to one end of a crank arm 89 whose other end is pivotally connected at 90 to a worm wheel 91 engaging with a worm 92 secured to a shaft 93 supported by bearings 94 and 95. The shaft 93 has at its end a clutch 97 secured thereto. A shaft 93' continuously rotated by a suitable driving source (not shown) and supported by a bearing 96 coaxially of the shaft 93 has a clutch 98 engageable with the clutch 97. Although the clutch 98 is schematically shown, it is so constructed as to be rotated with the shaft 93' but to be shiftable for engagement with or disengagement from the clutch 97. The clutch 98 is provided with a peripheral groove 99 into which is inserted one end of a shift lever 100 pivoted at its other end at 101. Engagement and disengagement between the clutches 97 and 98 are effected by an electromagnet 102 through a pulling member 103 with its one end pivotally connected to the member 100 and the other end cooperated with the electromagnet 102. The electromagnet 102 is energized and deenergized through a suitable time switch mechanism (not shown) in timing operative relation to the other various means or mechanisms of the apparatus already mentioned. It is so arranged that upon engagement of the rotating clutch 98 with the clutch 97, the swing arm 87 secured to the gear 86 will be moved by the crank arm 89 through a predetermined angle so as to rotate gear 86 a predetermined amount to cause the required advance of the shaft 53 through the gear 84 and the rack 83. Continued rotation of gear 91 will cause reverse movement of swing arm 87. Thus, it will be understood that the required advancement and retreatment of the shaft 53 of the sliver carrying means 50 can be effected by energizing and deenergizing the electromagnet 102 at predetermined intervals of time so that the sleeve 76 (and hence the shaft 53) may be advanced and retreated for a predetermined distance at predetermined time intervals.

The screw conveyor 30 will now be described in detail. In the conventional drawing systems, a given number of slivers (usually from 6 to 8) are supplied to a drawing frame and when one of the slivers has been exhausted (i.e. when the sliver container or can has been emptied) a new sliver from a new can is manually supplied to the position vacated by said exhausted sliver. This requires the worker to pay close attention to find where the new sliver is to be supplied. Thus, it will be apparent that it would be very convenient if the drawing frame is so modified that the new supply or supplement of a new sliver may be made always at a fixed position. This is true particularly in the system of this invention where the sliver supplementing operation is automatically carried out.

According to this invention, this is accomplished by causing the slivers S_2 being fed to the drawing frame B_1 to move in the direction of arrow F (FIG. 2) by means of said sliver guide or screw conveyor 30. Referring to FIG. 9, the conveyor 30 has a shaft 31 which horizontally extends in parallel to the drawing rollers of the drawing frame B_1 and is intermittently driven from a suitable source of power D. There is provided a convolution wall 32 on said shaft 31 so as to receive and guide a sliver in each groove or space formed by adjacent wall sections. The shaft 31 is rotated so that the slivers S_2 are moved one pitch of the screw before the container 12g of FIG. 2 is emptied, so that a groove at a fixed position is vacated for receiving the supplemental sliver from the sliver carrying means 50 when the latter swings to the direction of the arrow J (FIG. 10).

Indicated with the numeral 33 is a curved member for guiding the slivers from the containers 12b-12g.

All the mechanisms of this invention are timed to cooperate with each other to complete the various operations in a proper sequence, but there might be a variance (by one) in the number of the slivers S_2 being fed to the drawing frame B' for a very short period of time. This does not noticeably affect the quality of the resulting sliver because such a small irregularity can be corrected by a suitable automatic control (not shown) associated with the drawing frame B' .

While FIG. 6 shows a preferred arrangement of containers employed in the embodiment described hereinabove, it will be understood that it is equally satisfactory for the purpose of this invention to arrange the containers in a triangular or polygonal pattern. Furthermore, it is also possible to adopt a system in which, as shown in FIG. 7, containers are forced in one at a time by a push arm 113 in the direction of arrow K into an annular compartment 112 formed by the outer wall 110 and the inner wall 111.

The essential feature of this invention is to automatically and continuously charge a plurality of successive cans or containers with the sliver delivered from one drawing frame and to automatically and continually supply the slivers to the next drawing frame.

While a single embodiment of this invention has been shown and described, it is apparent that there may be many changes in structure and operation thereof without departing from the scope of this invention.

What we claim is:

1. An apparatus for automatically and continually receiving a sliver delivered from a first drawing frame and supplying the sliver so received as a plurality of slivers to a second drawing frame, said apparatus comprising a number of containers arranged in an endless series and at least equal to the number of slivers to be fed to the second drawing frame plus three, means on which said containers are mounted for intermittently moving the containers in a path extending between the first and second drawing frames, drive means for moving said mounting means, a coiler adjacent the first drawing frame and positioned above said path and feeding a sliver

from the first drawing frame so that an empty container below the coiler is filled with a sliver delivered from the first drawing frame through the coiler and is then moved and a next empty container is filled, and means for engaging a sliver from a filled container and feeding the end of said sliver to the second drawing frame when the sliver in another container preceding said filled container along said path is exhausted, whereby the number of slivers being fed to the second drawing frame is kept constant.

2. An apparatus for automatically and continually receiving a sliver delivered from a first drawing frame and supplying the sliver so received as a plurality of slivers to a second drawing frame, said apparatus comprising a number of containers arranged in an endless series and at least equal to the number of slivers to be fed to the second drawing frame plus three, said three containers being one container which is filled, a second being in the process of being filled, and a third one being empty and awaiting filling, means on which said containers are mounted for intermittently moving the containers in a path extending between the first and second drawing frames, drive means for moving said mounting means, a coiler adjacent the first drawing frame and positioned above said path and continuously feeding a sliver from the first drawing frame so that an empty container below the coiler is filled with a sliver delivered from the first drawing frame through the coiler and is then moved and a next empty container is filled with the unbroken sliver extending from the top of the filled container to the bottom of said next empty container, and means for engaging and severing a sliver extending between a filled container and a succeeding container and feeding the end extending from the first of said two containers to the second drawing frame when the sliver in another container preceding said two containers along said path is exhausted, whereby the number of slivers being fed to the second drawing frame is kept constant.

3. An apparatus as claimed in claim 2 in which said means for engaging, severing and feeding the sliver comprises a sliver lifting means for engaging said sliver portion and lifting it and then holding the lifted sliver, and a sliver grasping means for grasping the end of the sliver adjacent the point where it is held and carrying the grasped sliver away from the point at which it is held for severing the sliver, and thereafter carrying the grasped sliver to the second drawing frame and feeding it thereto.

4. An apparatus as claimed in claim 3 in which the sliver lifting means comprises a swing arm and actuating means swinging said swing arm upwardly to lift the said sliver portion, and said sliver grasping means comprises two arms pivotally connected with each other and each

having a clamping roller at the upper end thereof, means engaging said arms for normally keeping said rollers away from each other, means engaging said arms for pivoting said arms to bring said rollers together, a mechanism on which said two arms are mounted for advancing and then swinging said two arms, said means for pivoting said arms being actuated upon advancement of said two arms for causing the clamping rollers to grasp the end of the sliver, and said advancing means then swinging said two arms to a point adjacent said second drawing frame for feeding the severed end of the sliver into said second drawing frame.

5. An apparatus as claimed in claim 4 in which said sliver engaging, severing and feeding means further comprises a positively driven roller adjacent the first pair of rollers in said second drawing frame, said positively driven roller being in the path of one of said clamping rollers, whereby the clamping roller engages said positively driven roller at the end of the swinging movement of said two arms and the clamping rollers are driven to positively feed the end of the sliver grasped therebetween into said second drawing frame.

6. An apparatus as claimed in claim 4 in which said advancing means further includes means for swinging said two arms back to their original position and withdrawing them.

7. An apparatus as claimed in claim 4 in which said sliver engaging, severing and feeding means further comprises a positively driven screw positioned adjacent the second drawing frame and over one end of which said severed end of said sliver is laid when said two arms are swung to feed the severed end of the sliver to said second drawing frame, and means connected to said screw for intermittently driving said screw in timed relationship to the said engaging, severing and feeding means.

8. A method of automatically and continually delivering a plurality of slivers to a second drawing frame which slivers are delivered from a first drawing frame as a single sliver, comprising the steps of coiling the sliver from the first drawing frame into a succession of containers while causing the sliver to extend from the top of a filled container to the bottom of the next succeeding container, and intermittently moving said containers along a path between the first and second drawing frames, and then successively engaging the sliver between a filled container and a succeeding container, lifting the sliver, severing the sliver, and grasping the severed end from the first of the two containers and feeding it into the second drawing frame, said lifting, severing and feeding taking place at a time when the sliver in a container preceding the filled container along the path is emptied.

No references cited.