April 29, 1952 J. J. McCANN 2,594,783

POT SPINNING APPARATUS

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Fig. 1.

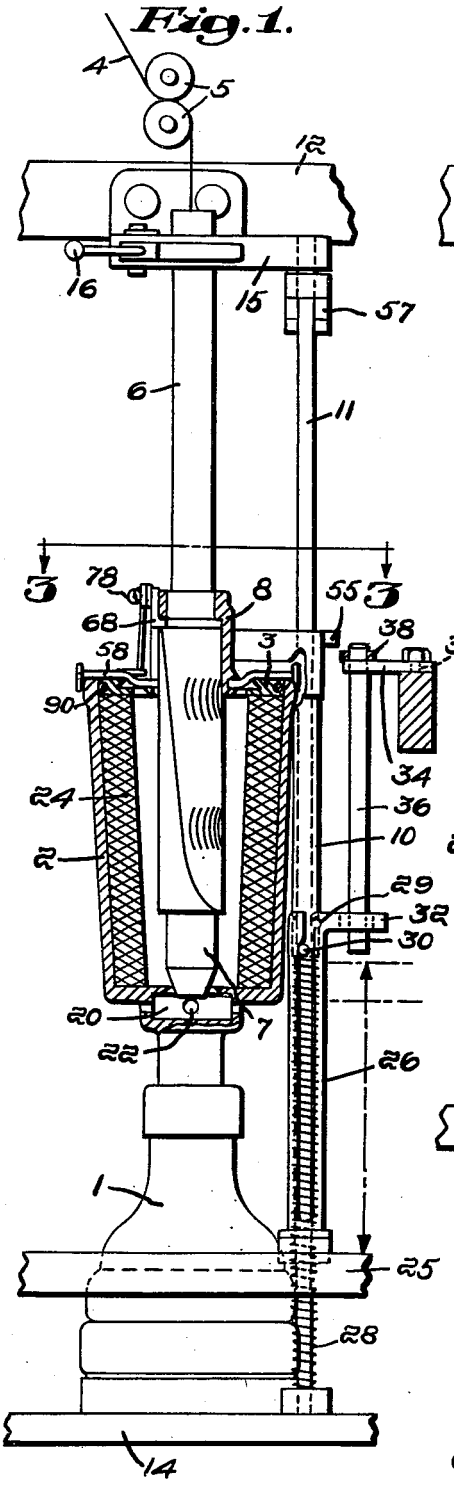

Fig. 2.

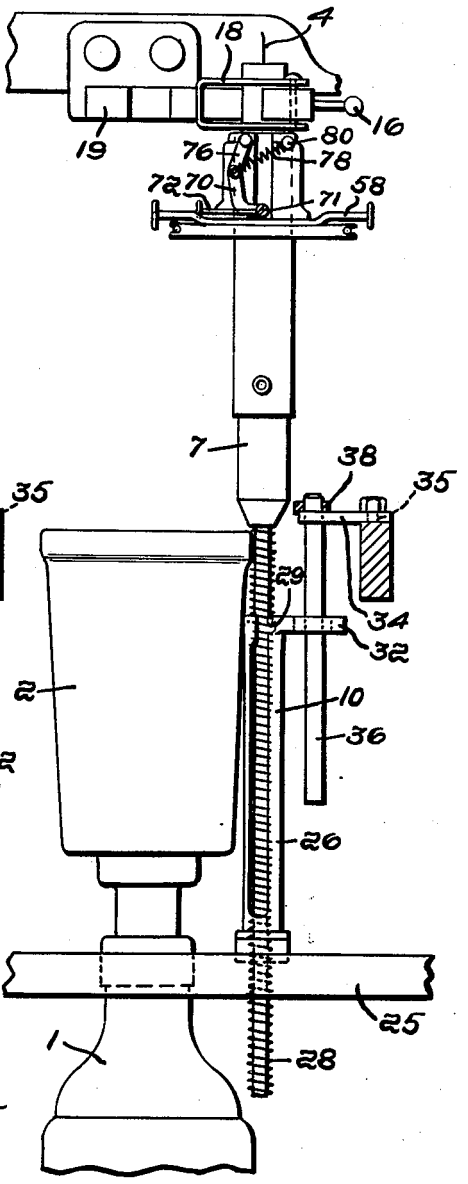

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Fig. 4.

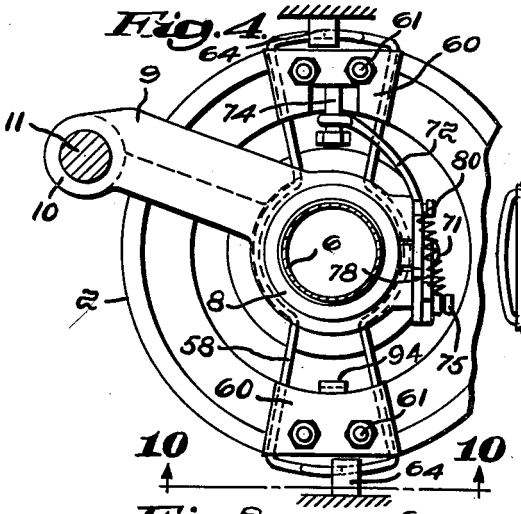

Fig. 3.

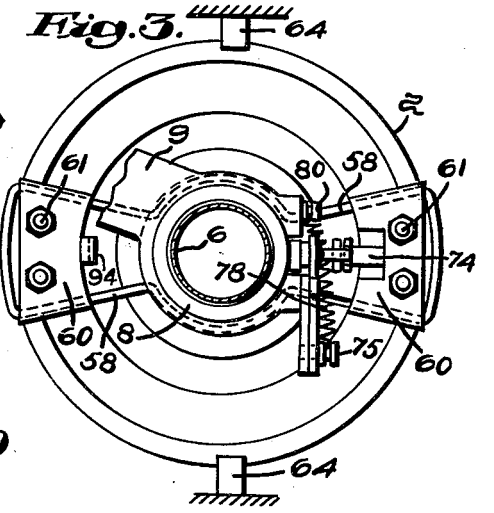

Fig. 8.

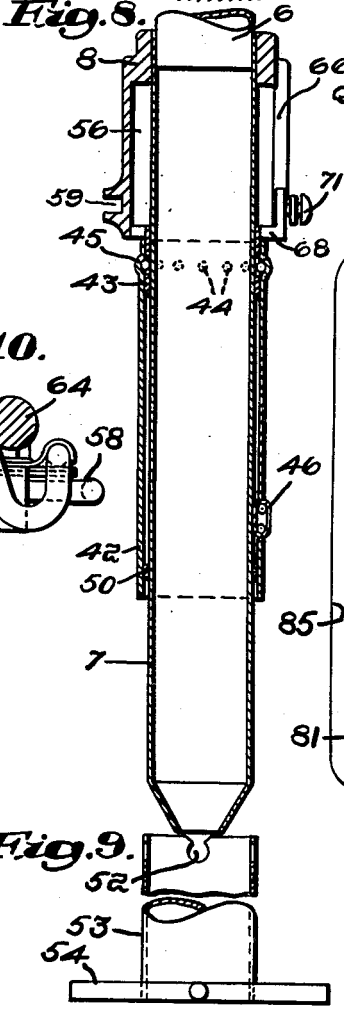

Fig. 7.

Fig. 6.

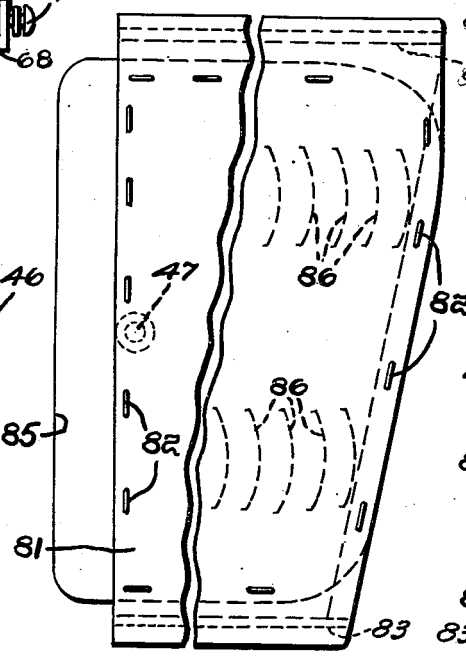

Fig. 5.

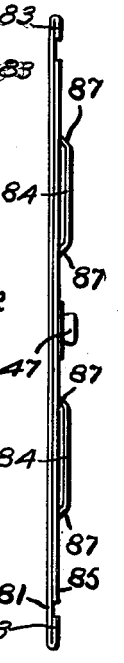

Fig. 10.

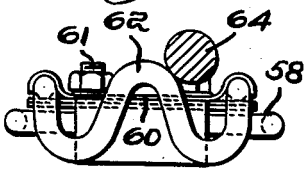

Fig. 9.

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Fig. 11.

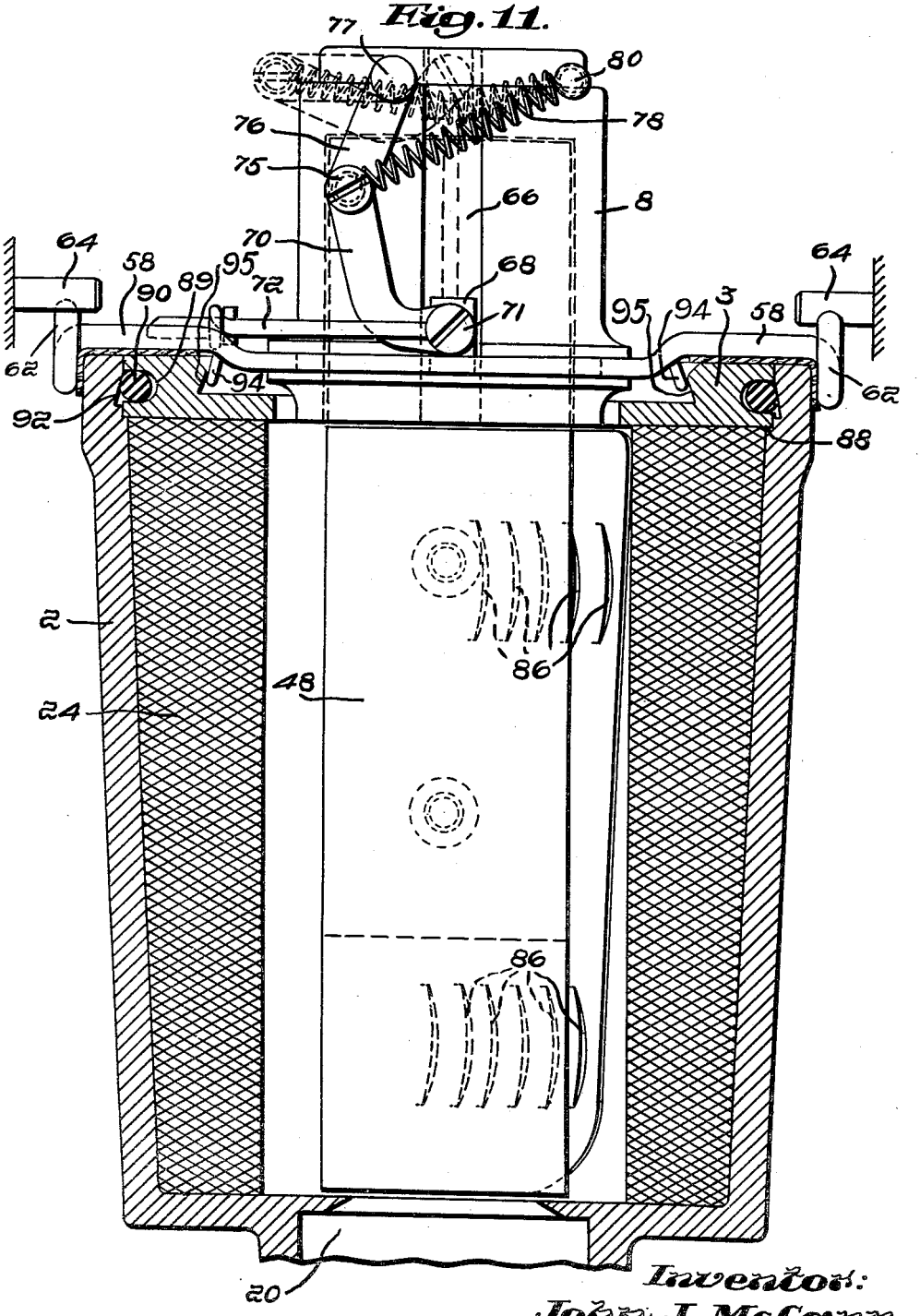

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Fig. 12.

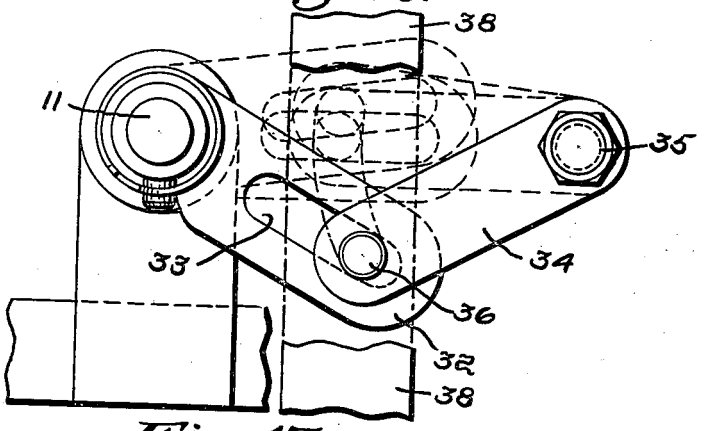


Fig. 13.

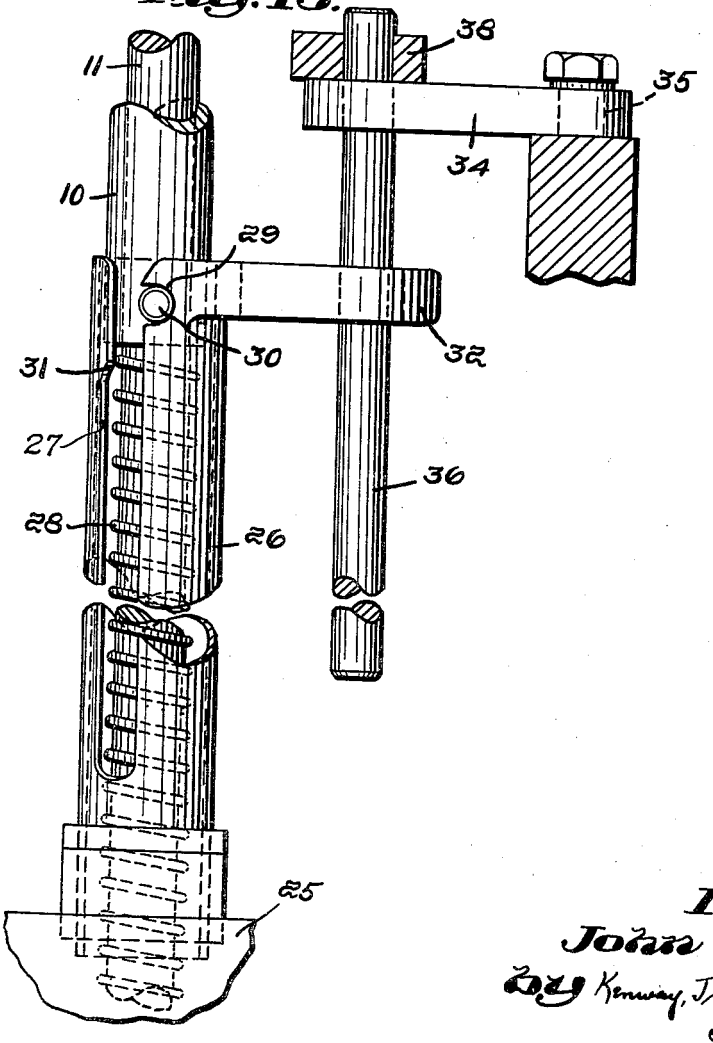
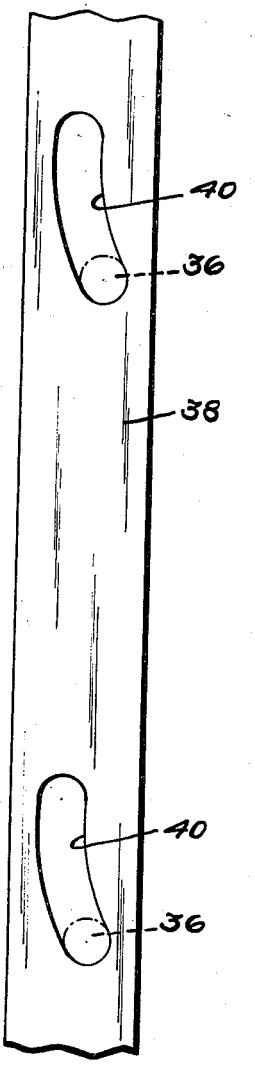


Fig. 14.



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UNITED STATES PATENT OFFICE

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POT SPINNING APPARATUS

John J. McCann, Lowell, Mass.

Application January 23, 1951, Serial No. 207,315

20 Claims. (Cl. 57—76)

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This invention relates to the art of spinning a continuous strand of fibrous material into a hollow package by centrifugal force within a rotating pot as described in my Patent 2,291,819, Reissue Patent 23,232, and Patent 2,563,053, dated August 7, 1951. One feature of the invention relates to the insertion of an expanding tubular core into the yarn package while the pot is rotating, the core serving to support the yarn package when the pot is stopped.

The tubular core which I have employed comprises a flexible resilient sheet rolled into restricted tubular form and held to such form during the spinning operation. The invention herein relates to novel mechanism including a pot engaging brake for employing the pot inertia first to eject the rolled sheet from restricted to expanding position in the pot and then to stop the pot rotation. The mechanism includes means for thus treating a single pot or all the pots of the machine simultaneously.

A further feature of the invention embodies a pair of spring operated levers adapted in retracted position beyond dead center to hold the sheet ejecting mechanism retracted, but quickly operative to perform the ejecting operation when initially moved forwardly by the spinning pot inertia to a position beyond dead center. Engagement of the brake with the spinning pot provides this initial movement and the brake together with the spring operated levers thereupon function to eject the coiled sheet into the pot, and the brake then immediately functions to stop the pot rotation.

The spinning apparatus includes a tube for guiding the strand into the spinning pot and my improved coiled sheet tubular core disclosed herein is provided with a snap fastener for detachably connecting the sheet to this tube, thereby retaining the sheet in restricted coiled condition and maintaining it in proper alignment during its insertion into the pot and during its expanding movement therein. The sheet is also provided with novel integral ratchet teeth for supporting the coiled sheet against inward collapsing movement when engaged by the yarn package and with a fabric facing for engaging the package as hereinafter described.

Another novel feature of the invention comprises a cover for the spinning pot provided with a resilient gasket normally disposed in inoperative position within the cover but adapted to move outwardly into locking engagement with the pot by centrifugal force when the pot is rotated at spinning speed.

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The production of a spinning machine embodying the above novel features comprises the primary objects of the invention. Other features and advantages of the invention will be more readily understood and appreciated from the following description of preferred embodiments thereof selected for purposes of illustration and shown in the accompanying drawings in which:

Fig. 1 is a fragmentary side elevation, partially in section, of one unit of an apparatus embodying my invention,

Fig. 2 is a side elevation thereof with certain parts in another position,

Fig. 3 is a plan view, partially broken away, taken on line 3—3 of Fig. 1,

Fig. 4 is a like view with the parts in another position,

Fig. 5 is an end view of a resilient sheet employed in rolled tubular form to support the yarn package,

Fig. 6 is an elevation of the sheet,

Fig. 7 is a plan view of Fig. 6,

Fig. 8 is a fragmentary longitudinal sectional view through the strand traversing tube,

Fig. 9 is a side elevation, partially broken away, of a tool for coiling the sheet to tubular form on the strand traversing tube,

Fig. 10 is a fragmentary view taken on line 10—10 of Fig. 4,

Fig. 11 is an enlarged elevation showing the spinning pot in longitudinal section,

Fig. 12 is a plan view of Fig. 13,

Fig. 13 is an enlarged fragmentary elevation of the traversing motion driving mechanism, and

Fig. 14 is a fragmentary plan view of Fig. 13.

As illustrated in my Patent 2,321,404, a pot spinning machine embodying my invention comprises an oblong frame on and along which is mounted a row of spinning pots. Since the pots and their cooperating mechanism are duplicates along the frame, illustration and description of one pot together with the cooperating novel features comprising this invention will suffice.

In the drawings, 12 indicates a horizontal upper portion of the frame for mounting the strand guiding tubes. Each spinning pot 2 is driven by and mounted vertically above and on a motor 1 resting on a base 14. The pot is open at the top and is provided with a cover 3 having a centrally disposed opening into the pot. The strand 4 of fibrous material to be spun is fed downwardly by and between a pair of cooperating rolls 5 into and through a strand guiding tube 6. A traversing tube 7 including a housing 8 is mounted to slide telescopically over the normally fixed

tube 6, the tube 7 extending downwardly into the pot through the cover opening during spinning. The housing 8 is integral with an arm 9 and a sleeve 10 on a vertical rod 11 supported at its top and bottom ends in the frame members 12 and 14.

The guide tube 6 is carried on the free end of an arm 15 mounted on the top end of the rod 11. The arm 15 supports the tube for swinging movement to and from the positions illustrated in Figs. 1 and 2. A clamp including an operating handle 16 and a yoke 18 cooperating with a fixed bracket 19 extending forwardly from the frame 12 is provided for securing the guide tube 6 in operative position over the spinning pot. The leading end of the strand 4 is drawn downwardly into the pot by a current of air generated in the bottom of the pot. A chamber 20 in the bottom of the pot is adapted to receive the forward end of the traversing tube 7 during the doffing operation and outwardly extending holes 22 from the chamber generate the current of air.

The traversing mechanism is connected to the sleeve 10 to reciprocate the tube 7 vertically within the spinning pot whereupon the traveling strand is spun into a hollow package 24 by centrifugal force. This traversing mechanism (not shown) embodies a bar 25 extending the length of the machine and mechanism for reciprocating the bar through the vertical path indicated by arrows in Fig. 1. A sleeve 26 resting on the bar surrounds the rod 11 and an expansion spring 28 on the rod. Reciprocation of the bar functions to reciprocate all the sleeves 26 vertically. The spring 28 is disposed between the frame member 14 and the bottom end of the sleeve 10 and is of a strength only to counterbalance the weight of the sleeve 10 and attached mechanism in spinning position. The sleeve 26 is slotted vertically and one wall of the slot is notched at 29 to receive a pin 30 carried by the sleeve 10. When the pin is engaged in the notch, Fig. 13, the sleeve 26 is connected to and reciprocates the sleeve 10. The other wall 27 of the slot in sleeve 26 is inclined at 31 to provide a downwardly facing shoulder for engaging with the pin as and for the purpose hereinafter described.

An arm 32 fixed to each sleeve 26 is slotted at 33. An arm 34 pivoted at 35 carries a rod 36 extending downwardly through the slot 33 of the adjacent arm 32. When the arms are in the full line position of Figs. 12 and 13 the sleeves 10 and 26 are connected. When the arms are swung to the broken line position of Fig. 12, the sleeve 10 is released from the sleeve 26. As illustrated in Fig. 14, a bar 38 slotted at 40 to receive the top ends of the rods 36 can be provided for disengaging all the sleeve connections simultaneously. The bar 38 is ordinarily employed to doff all the spinning pots simultaneously only in cases of emergency, such as should the electric power fail or for other reasons. In commercial practice the pots are ordinarily doffed individually or in small groups.

The sleeve 42 is supported for rotation on the traversing tube 7 by a plurality of anti-friction balls 44 within a cage 43 slidable on the tube and enclosed within an annular ring 45 integral with the sleeve. One snap fastener element 46 carried by the tube is adapted to receive a cooperating snap fastener element 47 carried on one end of a resilient and flexible sheet 48 constructed of any suitable material such as aluminum, plastic or the like. The sheet is adapted to be rolled into tubular form to provide an expansible core for supporting the yarn package 24.

Four lugs 50 carried on the bottom end of the sleeve 42 are adapted to be engaged within the end recesses 52 of a tool 53 slidable over the tube 7. Rotation of the tool by its end bars 54 is adapted to rotate the sleeve and coil the sheet 48 thereonto, it being understood that the sheet snap fastener element 47 has been attached to the snap fastener element 46. The operator rotates the tool with one hand and guides the free end of the sheet with his other hand. When the sheet has been rolled into tubular form it is inserted in the chamber 56 of the housing 8 to the position shown in Fig. 1.

During the application of the sheet 48 to the tube 7, the tube 7 and connected mechanism including arm 9 and sleeve 10 are in the raised position of Fig. 2 and are supported in that position by suitable means including a lug 55 engageable in a recess 57, similar to that illustrated in my said copending application. When spinning is to be performed this mechanism and tube are swung laterally to the position of Fig. 1 and clamped in such position by the yoke 18. The housing 8 together with its connected mechanism is forced downwardly against the action of the spring 28 and the tube 26 rotated to engage the pin 30 within the notch 29.

Carried on the housing 8 is a brake including a yoke 58 constructed of heavy wire. The yoke includes an intermediate portion embracing the housing in a groove 59 and two like end portions extending radially outward at opposite sides of the housing. Two brake shoes 60 are secured to the two end portions of the yoke by clamping bolts 61 and each outer end of the yoke has an upwardly curved intermediate portion 62 illustrated in Fig. 10. These curved portions 62 are adapted to cooperate with two fixed abutments 64 at diametrically opposite sides of the housing in the manner hereinafter described.

The housing is slotted vertically at 66 and an L-shaped sheet ejecting element 68 is mounted to slide in the slot. The lateral bottom end of the element extends over the coiled sheet as illustrated in Fig. 1 and is welded to the cage 43 (Fig. 8). One end of a lever 70 is pivoted to the element at 71 and a short cable 72 connects this pivot to a pin 74 secured to the brake. The other end of the lever 70 is pivoted at 75 to one end of a lever 76 pivoted at its other end to the housing at 77. A spring 78 has its two ends attached to the pivot 75 and the housing at 80. When the element 68 is in the raised position (broken lines, Fig. 11) the pivot 75 is above dead center and the spring functions to hold the parts in this position. When the element 68 is moved downwardly to a position below the pivot 75 the spring 78 functions quickly to pull the parts to the full line position of Fig. 11, thereby ejecting the coiled sheet into the pot to the full line position.

The sheet 48 is of resilient material and quickly expands into contact with the yarn package when ejected to the full line position of Fig. 11. The sheet remains attached to the sleeve 42 during the ejecting operation whereby holding the coiled sheet properly aligned at its top and bottom ends during the ejecting and initial expanding operations, thereby assuring proper engagement of the sheet with the yarn package. The outer face of the sheet is covered with a fabric 81 attached by staples 82 and extending beyond the top and bottom margins of the sheet. The function of the fabric is to facilitate holding contact with the yarn package, particularly at the margins of the sheet, and to prevent slubbing

off of the yarn at the marginal ends of the package. The top and bottom margins of the fabric can be turned over and stitched as illustrated at 83 in Fig. 6.

The sheet is provided with one or more series of ratchet teeth 84 cut from the end portion of the sheet opposite to the end carrying the snap fastener 47. The edge 85 of the sheet is adapted to engage these teeth and prevent inward collapsing movement of the sheet when the package contracts thereonto upon stopping the pot rotation, as more specifically illustrated in my said copending application. Each tooth 84 comprises a portion of the sheet bent outwardly along a single unidirectional line 86 cut through the sheet. The sheet is upset at the ends of this line to provide integral shoulders 87 for holding the tooth in its outwardly bent position. It will be readily apparent that these teeth 84 cannot return or be bent back into the plane of the sheet as can teeth which are cut along a substantially U-shaped line. The cut is preferably made along a line 86 of arcuate configuration thereby providing the teeth with considerable overhang as illustrated in Fig. 7.

The spinning pot cover 3 is of a size to fit into the open top end of the pot and rest on an annular shoulder 88 therein. The peripheral margin of the cover is provided with an open annular recess 89 facing radially outward. A resilient gasket 90 within the recess normally contracts to a position disposed wholly within and at the bottom of the recess. The inner wall of the pot chamber opposite to the cover recess is recessed or beveled inwardly at 92 as illustrated in Fig. 11. When the pot is rotated at spinning speed centrifugal force moves the gasket outwardly into engagement with the pot wall at 92 thereby securing the cover in place in the pot. Two spring latches 94 carried by the brake shoes 60 are adapted to cooperate with shoulders 95 on the cover 3 to hold the brake down on the cover and spinning pot when the brake is moved to that position (Fig. 11).

The operation of the machine is substantially as follows, it being understood that the descriptive reference to a single spinning pot applies likewise to all the pots. The coiled sheets 48 are applied to the sleeves 42 with the sheet ejecting mechanism raised to the broken line position of Fig. 11. The guide tube 6 with its attached parts is then swung to the position of Fig. 1 and secured in spinning position by the clamping yoke 18, the traversing tube with attached parts is pushed downwardly into the pot, and the pin 30 is engaged in the adjacent notch 29 of the traversing mechanism. The traversing mechanism is then in position to reciprocate the traversing tube 7 within the pot and thus guide the strand through the winding path within the pot. The pots are brought up to spinning speed and the strands are fed downwardly into the pots. It will be understood that the slotted bar 38 permits the individual engagement and disengagement of the sleeves 10 relative to the traversing mechanism. During the spinning operation the brake 58 is in the position of Fig. 3 and the traversing mechanism in its lowermost position brings the brake to a position closely approaching but not engaging the pot. The spinning operation now continues until the yarn package within the pot has reached the desired size.

All the pots can be doffed simultaneously by moving the bar 38 longitudinally to move all the arms 32 and 34 from the full line position to the dotted line position (Fig. 12), thus releasing the sleeve 10 from the traversing mechanism, or each pot mechanism can be operated individually. In commercial practice the pots are ordinarily doffed individually or in small groups. To perform the doffing operation the sleeve 26 is rotated, during the upstroke of the sleeves 10 and 26, in a direction to release the pin 30 from the notch 29 and engage the wall 27 with the pin. The sleeve 10 and attached parts, being counterbalanced by the spring 28, thereupon become motionless while the sleeve 26 rides upwardly over sleeve 10.

The said rotation of the sleeve 26 places the shoulder 31 over the pin 30 so that in the downward stroke the shoulder 31 engages the pin whereupon the sleeve 10 and attached parts are drawn downward to a position engaging the brake shoe with the spinning pot. The latches 94 thereupon engage the shoulders 95 and hold the brake in braking engagement with the pot and cover. It is also noted that the expanded gasket 90 secures the cover 3 against rotation relative to the pot 2 thus providing a substantial braking surface for the brake shoes 60.

The engagement of the brake with the pot immediately rotates the brake from the position of Fig. 3 to the position of Fig. 4 and this movement acting through the cable 72 pulls the ejecting element 68 downward to a position disposing the linkage 70—76 past dead center. The spring 78 thereupon immediately supplements the cable pull and quickly completes the ejection of the coiled sheet 48 into the spinning pot. The coiled sheet, being released from the chamber 56, immediately expands into contact with the package 24. During the ejecting and the expanding operation the snap fastener attachment serves to hold the sheet properly aligned for full engagement with the package. At the end of the expanding operation, the sheet detaches from the snap fastener element 46 and operates through centrifugal force to engage tightly against the package. The margin 85 of the sheet also engages the teeth 86 and prevents collapsing of the coiled sheet and the package as the pot stops rotating and the package contracts onto the coiled sheet. The curved portions 62 of the brake engage against and beneath the abutments 64 thus holding the brake from rotating and forcing it into braking contact with the spinning pot. The rotation of the pot is thereby quickly stopped.

When the sleeve 26 forces the brake into contact with the pot the inclined shoulder 31 on the sleeve 26 cams the sleeve into its neutral position where it can continue to traverse freely past the pin 30. The pot is then doffed by moving the sleeve 10 and attached parts to the uppermost position wherein the sleeve 10 can be rotated because the pin 30 is above and out of the vertical slot in sleeve 26. The sleeve 10 and attached parts, after the clamp arm 15 is opened, are swung about the rod 11 to make clearance for the package with its supporting sheet to be removed from the pot. The pot cover 3, which is attached to sleeve 10 by the latches 94, together with the contracted gasket 90 are also removed and held from the pot during the doffing operation.

Having thus disclosed my invention what I claim as new and desire to secure by Letters Patent is:

1. Yarn spinning mechanism comprising a spinning pot mounted for rotation about a strand spinning axis, means for feeding a strand along said axis into the pot, means for rotating the pot to spin the strand into a package, traversing

mechanism for guiding the strand in the pot, support means carried by the traversing mechanism for holding in contracted condition and in a position adjacent the pot an expansible yarn package core in said contracted condition, a brake disposed in non-braking position adjacent to the pot and movable therefrom into braking engagement with the pot, and means associated with the brake for ejecting the core from the traversing mechanism into the pot by the pot inertia when the brake is engaged with the pot.

2. The yarn spinning mechanism defined in claim 1 in which the last named means includes a core ejecting element carried by the traversing mechanism and a cable connecting the element to the brake.

3. The yarn spinning mechanism defined in claim 1 in which the strand is fed vertically downward through the top end of the pot and the brake is disposed above the pot and at opposite sides of said axis.

4. The yarn spinning mechanism defined in claim 3 plus two fixed abutments disposed at opposite sides of said axis, and means carried by the brake in position to engage against and beneath the abutments and force the brake downward against the pot and hold the brake against further rotation upon rotary movement of the brake to the abutments by the pot.

5. The yarn spinning mechanism defined in claim 1 in which the last named means includes a spring supplementing the pot inertia to quickly eject the core into the pot.

6. The yarn spinning mechanism defined in claim 1 in which the last named means includes a core ejecting element carried by the traversing mechanism and a pair of pivotally connected and spring operated levers respectively pivoted to said element and the traversing mechanism for holding said element in retracted position on one side of dead center and operative with the pot inertia to move the element forwardly on the other side of dead center.

7. Yarn spinning mechanism comprising a spinning pot mounted for rotation about a strand spinning axis and adapted to spin by centrifugal force a hollow yarn package, a tube disposed about said axis for guiding a strand into the pot, a flexible resilient sheet coiled to expansible tubular form about the tube, means detachably connecting the inner end of the coiled sheet to the tube, supporting means on the tube for holding the sheet in contracted tubular condition about said axis during spinning, and operating means to release said sheet from said supporting means within said pot while the pot is still rotating whereupon the sheet expands into contact with the yarn package.

8. The spinning mechanism defined in claim 7 in which said means for connecting the sheet to the tube comprises two cooperating snap fastener elements respectively carried by the tube and sheet.

9. A sheet of flexible material for use in pot spinning mechanism as an expandable yarn core and adapted to be coiled in tubular form, one element of a snap fastener fixed to one end of the sheet for anchoring the sheet to a cooperating snap fastener element carried by spinning mechanism, and co-engaging abutments carried by the two end portions of the sheet for preventing inward collapsing of the coiled sheet after it has expanded to a position bringing said end portions into engagement.

10. A sheet of flexible material for use in pot spinning mechanism as an expandable yarn core and adapted to be coiled in tubular form, co-engaging abutments carried by the two end portions of the sheet for preventing inward collapsing of the coiled sheet after it has expanded to a position bringing said end portions into engagement, and a textile fabric attached to the sheet and disposed over the face that forms the outer face of the coil, said fabric extending beyond the two side margins of the sheet.

11. A sheet of flexible material for use in pot spinning mechanism as an expandable yarn core and adapted to be coiled in tubular form, co-engaging abutments carried by the two end portions of the sheet for preventing inward collapsing of the coiled sheet after it has expanded to a position bringing said end portions into engagement, said co-engaging abutments including a series of ratchet teeth cut from one end portion of the sheet and disposed in a direction to provide stop shoulders engaged by the other end of the sheet to prevent said inward collapsing of the coil, each of said ratchet teeth comprising a portion of the sheet bent outwardly therefrom along a single unidirectional line cut through the sheet, and upset shoulders integral with the sheet at the ends of each line for holding the ratchet teeth in said outwardly bent position.

12. The sheet defined in claim 11 in which said unidirectional line is of arcuate configuration.

13. The yarn spinning mechanism defined in claim 1 plus latch mechanism carried by the brake and cooperating shoulders carried by the pot for holding the brake in braking engagement with the pot when moved thereto from the non-braking position.

14. In yarn spinning apparatus, traversing mechanism comprising inner and outer relatively long driving and driven elements in telescopic engagement, one of the elements being slotted longitudinally, a pin carried by the other element and disposed in and movable with said other element longitudinally of the slot, means for reciprocating the driving element longitudinally, the slotted element having a recess therein open to and disposed laterally of said slot for receiving the pin, and shoulders on the slotted element within the recess for cooperating with the pin to secure the two elements against relative movement longitudinally, relative rotation of the elements being adapted to move the pin to and from the slot and recess.

15. The traversing mechanism defined in claim 14 in which said recess is at one longitudinal margin of the slot, and a shoulder at the other margin of the slot for engaging one side of the pin and limiting relative longitudinal movement of the elements in one direction, relative rotation of the elements in one direction being adapted to dispose the pin in the recess and relative rotation thereof in the opposite direction being adapted to dispose the pin in the path of movement of said shoulder.

16. In yarn spinning apparatus, traversing mechanism comprising a vertically disposed sleeve having a longitudinal slot open at the top end of the sleeve, a traversing member telescoped within the top end of the sleeve, a pin carried by the member and movable therewith in the slot and sleeve, shoulders carried by the sleeve at and laterally of the slot for engaging the pin upon rotary movement of the sleeve in one direction relative to the member, means for reciprocating the sleeve longitudinally, and a spring for counterbalancing the weight of the member.

17. The traversing mechanism defined in claim 16 in which said shoulders comprise two opposed shoulders at one margin of the slot for engaging opposite sides of the pin when the sleeve is rotated in one direction and one downwardly facing shoulder at the other margin of the slot for engaging the top side of the pin when the sleeve is rotated in the opposite direction.

18. The traversing mechanism defined in claim 16 plus a slotted arm carried by and extending laterally outward of the sleeve, a second arm disposed laterally of the sleeve and pivoted on an axis parallel with the sleeve, and a vertically disposed rod carried by the second arm and extending through the slot in the first arm, rotation of the second arm about said axis being adapted to rotate the sleeve.

19. A rotary spinning pot having a chamber open at one end of the pot for receiving and winding a strand into a hollow package by centrifugal force, a removable cover fitting within the chamber at said open end, means for securing

the cover in the chamber, a brake disposed in non-braking position adjacent to said cover and movable therefrom into braking engagement with the cover, and means for holding the brake against rotation and in braking contact with the cover.

20. The spinning pot defined in claim 19 plus latch mechanism carried by the brake and cooperating shoulders carried by the cover for holding the brake to the cover when moved thereto from the non-braking position.

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