

March 10, 1931.

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1,795,300

DOFFING AND DONNING MACHINE

Filed March 22, 1928

5 Sheets-Sheet 1

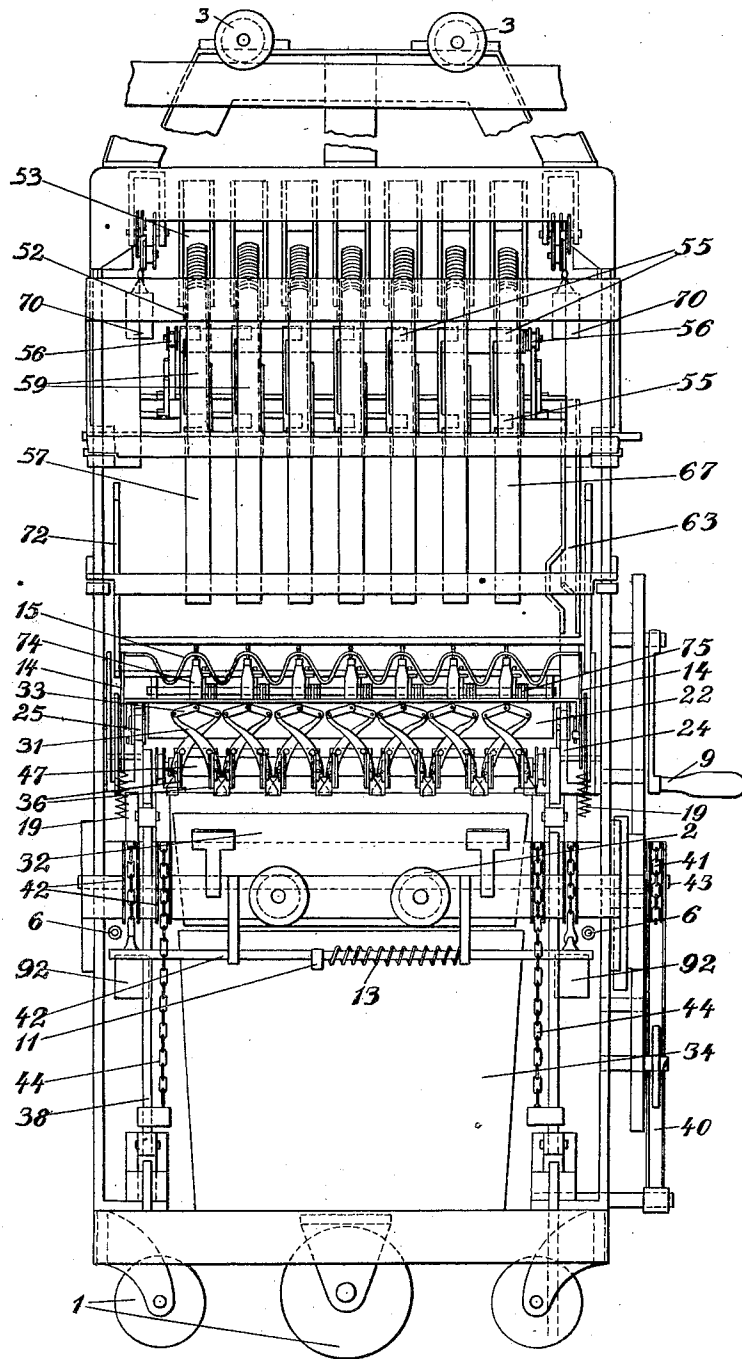


Fig. 1

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5 Sheets-Sheet 2

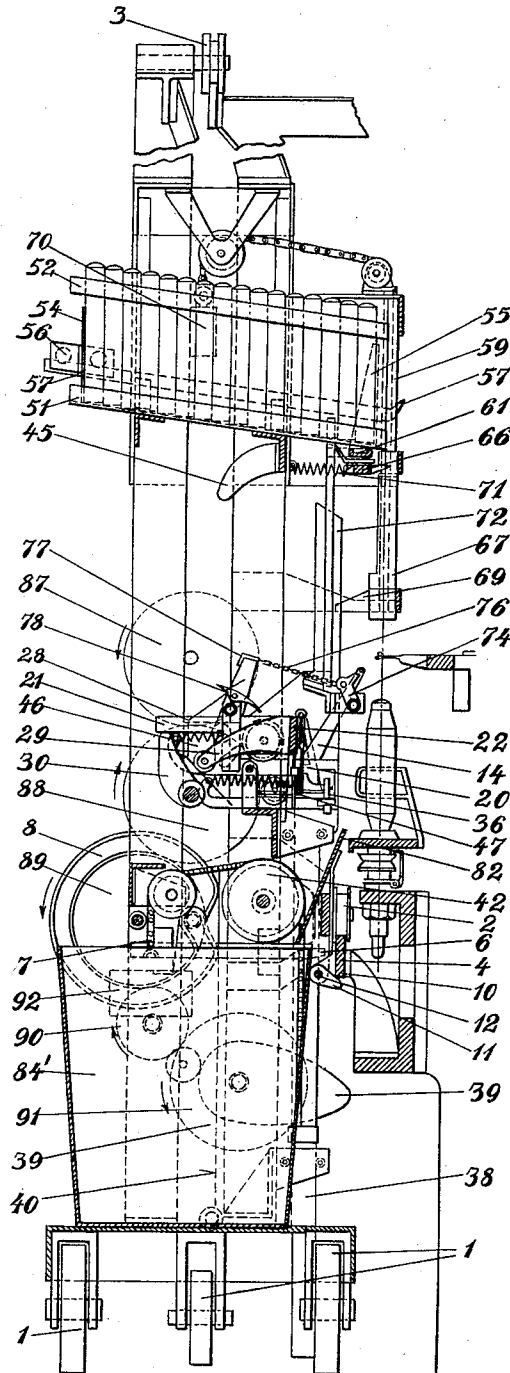


Fig.2

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5 Sheets-Sheet 3

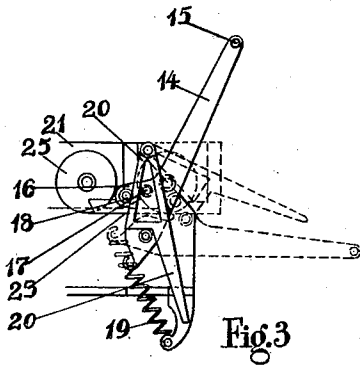


Fig. 3

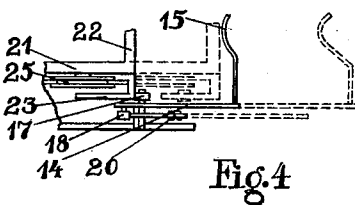


Fig. 4

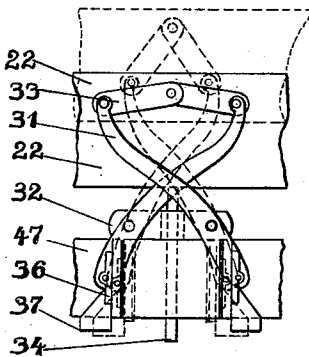


Fig. 8

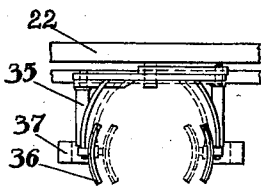


Fig. 10

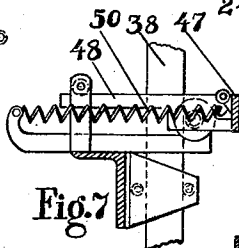


Fig. 7

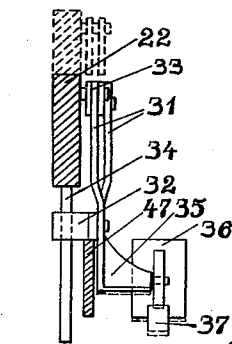


Fig. 9

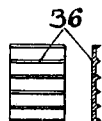


Fig. 11

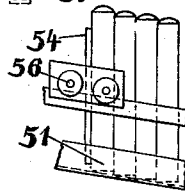


Fig. 14

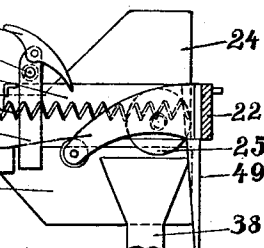


Fig. 6

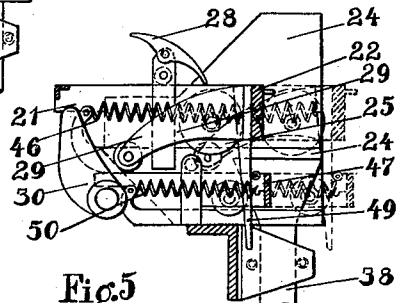


Fig. 5

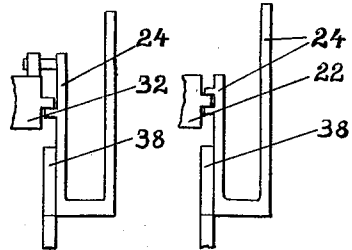


Fig. 12

Fig. 13

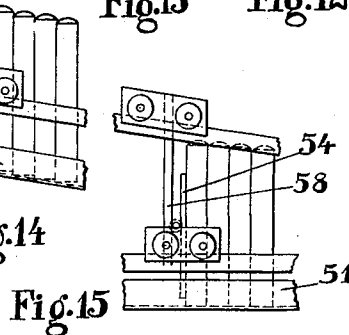


Fig. 15

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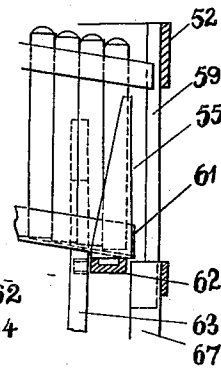
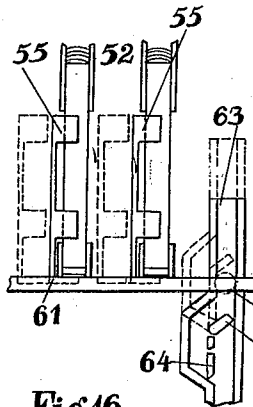
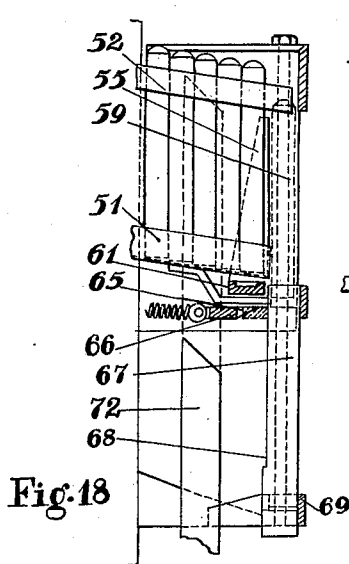


Fig. 16

Fig. 17

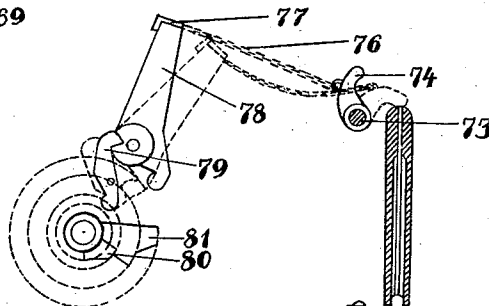
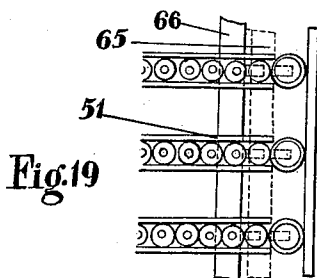


Fig. 20

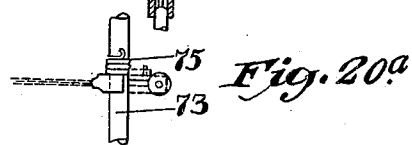


Fig. 20a

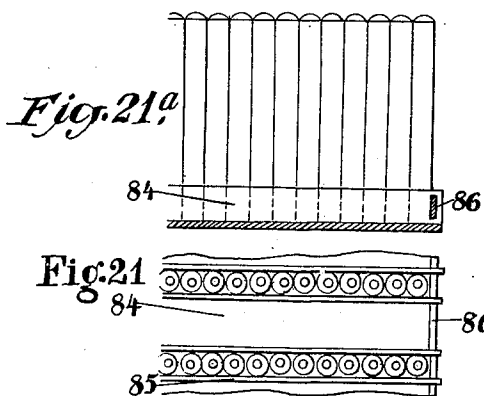


Fig. 21a

Fig. 21

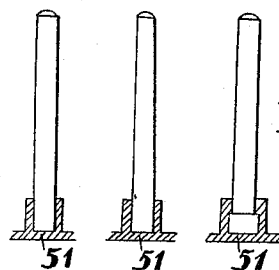


Fig. 22

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DOFFING AND DONNING MACHINE

Application filed March 22, 1928, Serial No. 263,720, and in Germany September 9, 1927.

The doffing of the full bobbins in water frames and the replacing thereof with empty bobbins are usually effected by hand work, for which purpose a large number of workers are required for operating each machine in consequence of the large number of bobbins and the very short time available for this work.

Now the object of the present invention is to carry out this work mechanically, this being done by means of an auxiliary machine, which effects the changing of the bobbins automatically in groups, and requires for its operation only one or two workers.

The invention is illustrated in the accompanying drawings, in which:

Fig. 1 is a front elevation of the improved doffing and donning apparatus.

Fig. 2 is a vertical section, partly in elevation, of the same, the apparatus being shown in operative relation to the frame of the spinning machine.

Fig. 3 is an elevation in detail of the mechanism for deflecting the threads from above the filled bobbins, preparatory to doffing said bobbins.

Fig. 4 is a plan of the same.

Fig. 5 is a detail in side elevation and partly in section of the frames for operating the thread deflector and the doffing mechanism.

Fig. 6 is a similar view showing the position of the doffing frame when elevated.

Fig. 7 is a view in elevation, partly in section, of the gripper carrying frame in retracted position.

Fig. 8 is a broken view in elevation, showing one of the bobbin grippers in open position in full lines and in gripping or operative position in dotted lines.

Fig. 9 is a side elevation of the same.

Fig. 10 is a plan of the same.

Fig. 11 shows in front and side elevations the corrugated face of the gripper plates.

Fig. 12 shows a modification for the mounting of the gripper frame.

Fig. 13 shows another form of such mounting.

Fig. 14 is an elevation of a detail showing the means for advancing the empty bobbins for the donning operation.

Fig. 15 is a similar view of a modified form of such advancing means.

Fig. 16 is a detail in elevation showing the means by which the plates for preventing advancement of the bobbins are periodically withdrawn.

Fig. 17 is a side elevation of the same.

Fig. 18 is an elevation of a detail, showing the means for delivering the advanced bobbins onto the spindles of the spinning machine.

Fig. 19 is a plan of the same.

Fig. 20 shows the means for automatically forcing the empty bobbins onto the spindles in the donning operation.

Fig. 20^a is a plan of the means for automatically operating the hammers.

Fig. 21 is a plan and Fig. 21^a a side elevation, partly in section, of the filler by which the empty bobbin magazine of the apparatus may be refilled with empty bobbins.

Fig. 22 is a sectional detail illustrating the manner of supporting the empty bobbins in the empty bobbin magazine of the apparatus.

Fig. 23 is a view in elevation, partly in section, showing a modified mechanism for delivering empty bobbins to the spindles of the spinning machine in the donning operation.

Fig. 24 is a plan view of the deflector for transposing the bobbins from the normal horizontal to the desired vertical position.

Fig. 24^a is a vertical section of the same.

Fig. 24^b is a similar section taken at right angles to the line of section of Fig. 24^a.

Fig. 25 is a view in elevation, partly in section, illustrating the means for maintaining a single delivery of empty bobbins in each chute at each operation of the apparatus.

Fig. 26 is a sectional view showing the means for supporting the empty bobbins in a magazine during the charging of a filled magazine into the apparatus.

The machine is in the form of a carriage, which can be moved on the floor by means of four wheels 1. The two side wheels are preferably larger than the end wheels, so that the entire machine admits of being steered as required. Furthermore there are, on the front of the machine, two pairs of rollers 2 and 3

arranged at different heights, which run on suitable guide rails on the water frame, and accordingly enable the auxiliary machine to be moved along the creel table. The lower guide rail 4 is secured to the creel table.

The machine is rolled from the floor on to these guide rails on the water frame to be operated, and then moved along the row of bobbins.

For the fixing of the auxiliary machine in the working position at a definite place in relation to the bobbins to be changed, the guide rail 4 is provided with notches, in which there engage bolts 6 (Fig. 2) secured to a cross bar 7. The bar 7 is connected with rollers gliding in grooves in two pulleys 8, and acquires the necessary reciprocating movement from a hand crank 9 by means of toothed transmission wheels 87, 88 and 89.

The changing of the bobbins can only be commenced when the bolts 6 engage correctly in the corresponding notches. Should the auxiliary machine not have assumed its correct position, the bolts 6 bear against the guiding frame 4, and the further rotation of the grooved pulleys 8, and therefore of the crank 9, is impossible, as will be immediately obvious.

When correctly operated the bolts 6 only come out of the corresponding notches in the guide rail after a complete revolution of the grooved pulleys 8, that is, after a completed working stroke, involving the doffing of the full bobbins and their replacement with empty bobbins on the group of spindles to be attended to. Until then the machine remains fixed in its working position.

The aforementioned notches in the guide rails 4 are made at equal distances from one another, so that the machine can be advanced stepwise. For the prevention of shocks in the stoppage of the machine during the engagement of the bolts 6 a special device is provided, which consists in providing recesses 10 at definite points in the lower edge of the guide rail 4, a pawl 11 secured to a shaft 12 under the action of a spring 13 engaging in the said recesses.

Now the present auxiliary machine has two tasks to perform, namely:

1. The doffing of the full bobbins; and
2. The filling of the spindles from which full bobbins have been removed with empty bobbins.

The doffing of the full bobbins involves the following operations:

1. Deflection of the thread from its working direction to avoid nipping and breakage thereof by the gripping devices of the machine.
2. Repulsion of the anti-ballooning separators.
3. Feeding the gripping devices to the full bobbins.
4. Clamping the bobbins.

5. The actual doffing of the full bobbins from the spindles.

6. Displacement of the doffed group of bobbins for the purpose of freeing the spindles for the mounting of empty bobbins thereon.

7. Release of the doffed bobbins.

8. Collecting the released bobbins in a box or receptacle.

The thread-deflecting device is shown in Figs. 3 and 4, and is also included in Figs. 1 and 2. It consists of two levers 14 arranged one on each side of the machine, with a profiled wire 15 which spans the entire breadth of the machine (see in particular Fig. 1), and which, when the lever arms 14 descend, deflects the thread that is being guided from the thread guide eyelet to the bobbin out of its normal direction.

Now the thread-deflector operates in the following manner:

The front of a frame 21, 22 which carries the gripping appliance and which is movably arranged in the machine in a direction transverse to the guide rails, and can therefore be guided to and from the creel table (see below), is provided with projections 23, which, when the frame 21, 22 is fed forwards, press against rollers 17, and move the thread-conductor in a clockwise direction.

The loop 15 of the profiled wire then comes between the bobbins and deflects the thread at each bobbin. As soon, however, as the projection 23 leaves the roller 17, since the gripping appliances have at the same time suitably approached the bobbins, the lever arms 14, under the action of the spring 19, spring back into their original position, and return the thread deflector to its starting condition.

The anti-ballooning separator push-off device, which effects the repulsion of the anti-ballooning separators (Figs. 3 and 4, as well as Figs. 1 and 2) consists of two single armed sector-shaped levers 20, which are arranged one on each side of the machine beside the thread-conductors, and the pivots of which are located nearer than those of the latter.

The action of this device is as follows: When the thread-conductor begins to incline, a roller 18 arranged on the second arm 16 of the lever 14 presses against the repeller 20 of the anti-ballooning separator, and constrains it to rotate in an anti-clockwise direction, as indicated in dotted lines in Fig. 3. Its end then pushes back one of the opposite anti-ballooning separators, and accordingly the group of anti-ballooning separators secured to the plate which is common to the latter.

Figs. 5, 6, 7, 8, 9, 10 and 11, as well as Figs. 1 and 2, show the gripping appliance, and also the means for moving it to and fro. The latter consists of a movable clamping frame 21, on a front ledge 22 of which the grippers

(Fig. 8) are pivotally mounted. The frame runs on guide rails 24 by means of rollers 25, which are provided with grooves on their periphery. The side walls of the frame glide in grooves in fulcrum brackets or standards 26 provided with rollers 27 and pawls 28. To the inside of the front ledge 22 is secured a lever 29 provided with a roller. During the rotation of cams 30, the frame 21 is moved forward, and moves the gripping appliances nearer to the bobbins. This new position of the frame is shown in dotted lines in Fig. 5. The new position is fixed by means of pawls 28, which engage in the corresponding recesses in the frame, and hold the same fast even when the rollers of the levers 29 leave the cams 30.

After the movement of the gripping appliances has taken place, the two jaws 36 (Fig. 10) of each of them stand one on each side of the bobbin to be doffed, and must now be moved nearer together for the purpose of gripping the bobbin between them.

This is effected in the following manner:— Each gripping appliance (Figs. 8, 9, 10 and 11, as well as Figs. 1 and 2) comprises for each bobbin two double-armed levers 31, which are pivotally connected with a ledge or bar 32, and the longer arms 31 of which are in their turn pivotally connected with one another by means of links or strips 33. The latter are in their turn pivotally attached to the front ledge 22 of the gripping frame. In this way the gripping appliances hang from the ledge 22.

The ledge 32 has a projection with a bore, through which a guiding bolt 34 passes and forms the central axis of the two clamping jaws. The short lever arms are provided with cross pieces 35 (Fig. 9) which terminate in pivots on which the clamping jaws 36 are rotatably mounted. The lower ends of the jaws are provided with counter-weights 37, which impart to them a constantly vertical position. The inner side of the jaws is grooved for the purpose of better gripping the full bobbins (Fig. 11).

The clamping frame 21 or the ledge 22 from which the clamping jaws are suspended, glides on the guide rails secured to the standards or fulcrum brackets 38. The standards 38 may be raised by means of a lifting appliance and at the same time raise the frame 21 with the ledge 22. During this movement of the frame 21, as will be evident from Fig. 8, the jaws 36 are moved nearer together, as indicated in dotted lines in Figs. 8 and 10, engage the full bobbins, and grip them.

The bobbins nipped by the gripping appliances must now be doffed from the spindles by an upward movement. This is effected according to Figs. 5, 6, 7, and also 1 and 2, by raising the gripping frame 21, with the relative position of the gripping appliances

shown dotted in Fig. 8 and the full bobbins clamped between the jaws 36 thereof.

The lifting appliance for the frame 21 consists of a cam disc 39 (Figs. 1 and 2) which is rotated by the common hand crank 9 by means of the toothed transmission wheels 87, 88, 89, 90 and 91. To the upper end of the lever arm 40 is secured the end of a chain 41. This chain passes round a chain-roller 42 and accordingly rotates the shaft 43 of the latter, upon which are mounted chain-rollers for the chain 44 connected with the standards 38 (Figs. 5, 6 and 7). To facilitate the raising, counter-weights 92 are provided.

As soon as the bobbins are taken by the gripping appliances, the frame 21 rises, and pulls the full bobbins off the spindles. This upward movement lasts until the lower edges of the bobbins have risen above the upper spindle points. The pawls 28 then strike against abutments 45 secured in the upper part of the machine frame and release the clamping frame, which, under the action of a spring 46, glides back into its initial position upon its horizontal guide rails, and accordingly guides the set of bobbins taken by the gripping appliances out of the plane of the spindles in an outward direction relatively to the water frame and sets the released spindles free to have empty bobbins mounted upon them. The clamped bobbins must now be released and collected in a suitable receptacle.

For the releasing of the full bobbins there serves the device already described, which is shown in Figs. 5 to 10 and also in Figs. 1 and 2.

After the return of the gripping frame 21 into its starting position, the lifting appliance begins to descend, the ledges 32 (Fig. 8) bearing at a definite level against the front ledge 47 (Fig. 8) of the frame 48 (Fig. 7) and compelling the lever arms 31 to separate. The jaws 36 then set free the gripped bobbins and go back into their original condition. The bobbins then slip down an inclined surface 82 (Figs. 1 and 2) into a collecting basket 84'.

The frame 48 slides on to the guiding rails secured to the machine frame, and therefore cannot be raised. The frame serves to keep the clamping jaws open in their lower position, that is, their initial position until the commencement of the upward movement. Since the clamping jaws must approach the full bobbins in an open condition, the frame 48 must also approach the bobbins. This is effected by means of two fingers 49 which are secured to the front ledge 22 and which carry the frame 48, 47 along with them in the forward movement of the frame 21, 22. In the upward movement of the frame 21 the fingers 49 leave the frame 47, 48, and the latter is set free and returns to its original position under the action of a spring 50. Since, however, the frame 21, 22 is also set

free from the pawls 28 in its highest position and returns under the action of the spring 46 into its starting position in relation to the vertical axis of the machine, the ledges 32, during the descent of the frame 21, 22, meet the front ledge 47 of the frame 48 in their correct position.

Both the frames 21, 22 and 47, 48, according to Figs. 5 and 6, run on their guide rails by means of rollers. They can, however, according to Fig. 12, glide in a groove, or according to Fig. 13 glide on a ledge against which they are pressed by rollers.

Besides the doffing of the full bobbins the present auxiliary machine must also effect the filling of the freed spindles with empty bobbins. For this purpose the following operations must be carried out:

1. Supply empty bobbins.
2. Move the bobbins towards the plane containing the axes of the spindles.
3. Bring the bobbin axis to the spindle axis.
4. Mount the bobbins on the spindles.
5. Secure the bobbins to the spindles in the appropriate manner.

The empty bobbins are placed in a magazine arranged in the upper part of the machine. The magazine consists of a number of compartments (Figs. 1 and 2) which each comprise a channel bottom 51 below and two side ledges 52 above. The empty bobbins form in each compartment of the magazine a row, the central plane of which is coincident with the axes of the spindles to be filled. From behind, a thrust plate 54 presses against the row of bobbins, and in front the row is shut off by a pusher or slide 55 (as shown in Figs. 14 and 15, as well as in Figs. 1 and 2).

The thrust plate 54 is secured to a carriage with rollers 56, which run on rails 57.

The channel 51 has an inclination forward. It may, however, be horizontal instead. In the latter case, on a horizontal rail, there is also provided a roller carriage, with the thrust plate 54, which is subject to the action of another thrust plate. The latter is then connected with a carriage running on the inclined rail.

For the forward feeding of the empty bobbin to be mounted upon the spindle, each compartment of the magazine has a vertical guiding channel 59 and a pusher 55, shown in Figs. 16 and 17. The guiding channel 59 has a radius of curvature which is about equal to that of the empty bobbin, so that the bobbin entering the channel is located at about the geometrical axis of the spindle to be filled. The pushers 55 of all the magazine compartments are secured to a cross bar 61, as shown in Figs. 16, 17, 18 and 19, which has at its end a roller 62. This roller runs in a slot in a vertical guide rod 63, and controls the horizontal reciprocation of the pushers 55.

The guide rod 63 is so constructed that during its upward movements the roller 62 is guided to the left and back by pivotally and resiliently secured flaps 64, as shown in Fig. 16, while during the downward movement it remains in its normal position.

When the roller 62 moves to the left, the pushers 55 come into the position shown in dotted lines in Fig. 16, and allow the resilient pressure of the thrust plate to act upon the row of bobbins of each magazine compartment and to move the row of bobbins forwards and expel the first bobbin into the guiding channel 59. During the return of the pushers 55 into their original position, the row of bobbins in the magazine compartment is again shut off, so that the front bobbin is separated and set free. The freed front bobbin, however, cannot for the time being drop down, but remains above the spindle on a tongue 65 projecting into the guiding channel 59.

Underneath the guiding channel 59 is arranged a vertically movable guiding passage 67, which has an elongated notch for the tongue 65 and permits the up-and-down movement without action upon the latter.

The guiding passage 67 has a projection 69, which bears against the gripping frame 21, 22, and is raised during its upward movement. As soon, however, as the frame upon contact with the projection 45, is horizontally displaced, the guiding passage 67 falls down again. For the sake of smoother movement the guiding passage 67 is provided with a counter-weight 70, as shown in Fig. 1.

The tongues 65 of all the magazine compartments are secured to a common ledge 66, which executes a horizontal reciprocating movement under the action of a spring 71, and of the oblique upper edge of a vertical guiding rod. In this manner the tongue is moved out of the guiding channel 59 or introduced into the latter, and accordingly lets the empty bobbin located therein drop down at the necessary moment. The bobbin now passes through the guiding passage and mounts itself upon the spindle.

The number of guiding channels and passages corresponds of course to the number of spindles to be simultaneously served.

The empty bobbin mounted upon the spindle still needs to be secured to the latter. This securing is effected by means of a special device, which is illustrated in Fig. 20 as well as in Figs. 1 and 2.

It consists of a row of hammers 74, which are mounted loose on a common shaft 73, and, under the action of a spring 75, tend to strike against the empty bobbin mounted upon the spindle. This, however, is prevented by chains 76 which are secured to a transverse girder 77.

The girder 77 spans the breadth of the machine and is secured to the two levers 78 ar-

ranged one on each side, which are held in their raised position by a pawl 79. When a cam 80 strikes against the other end of the pawl 79, the lever arms 78 become free and the hammers 74 strike the bobbins mounted upon the spindles. The lever 78 is brought back into its initial position by a cam 81.

The insertion of the fresh bobbins in the magazine compartments is effected by means of a flat box 84 (Fig. 21), which is subdivided in the same way as the magazine.

The front and rear walls 86 of the box 85 are displaceable. The box is filled with bobbins and inserted in the magazine. Thereupon the front and rear walls 86 are pushed out.

Figs. 23 to 26 show a different constructional form of the device for filling the spindles with empty bobbins. This device involves the following operations:—

1. The formation of a store of bobbins at least for one change of the set of bobbins.

2. The releasing of a bobbin from each magazine compartment.

3. The turning of the bobbin released from the magazine compartment in a horizontal position into the vertical position.

4. The guiding of the falling bobbin.

Moreover the device must not hinder the doffing of the full bobbins. The empty bobbins in reserve are stored in the compartments 98 of the magazine 93 in the upper part of the machine frame in a horizontal position, as shown in Figs. 23 and 26.

The bottom of each magazine compartment is provided with notches and is slidably arranged. By suitable displacement, the notches are so positioned that the set of bobbins from each magazine compartment descends, and the lowest bobbins take up their positions upon the pushers 95, 96, which are secured to a horizontally reciprocable frame 97.

During the movement of the frame 97 towards the right, the pushers 95 come out of the magazine compartment and the pushers 96 are introduced into it.

The entire set of spindles then descends and bears upon the pushers 96. During the movement of the frame towards the left, the last bobbin but one is shut off by the pushers 95 and the lowest bobbin set free.

The reciprocation of the frame 97 is effected by the oblique edge, which is secured to the rising part of the machine. As will be seen from Fig. 25, the edge 99 presses against the roller 101 of the frame and displaces the latter towards the left. When the edge 99 of the finger 100 descends, the roller returns under the action of the spring 102 and slides the frame towards the right.

The bobbins are arranged horizontally in the magazine compartments. Upon being released the freely falling bobbin strikes against the corner 106 of the guiding cham-

ber 104, as shown in Fig. 24, and changes its position to a vertical one. For this purpose the center of gravity of the bobbin is at that side of the point of impact necessary to induce the proper change in position of the bobbin, as indicated in Figure 24^a.

The bobbin which is now vertically positioned passes into a guiding aperture 108 and falls freely for a time, until it arrives in a guiding passage 110, as shown in Fig. 23. From this passage the bobbin is mounted upon the corresponding spindle of the water frame.

The guiding passages must be raised during the doffing. For this purpose all the guiding passages are mounted in a ledge 111, as shown in Fig. 23, which is vertically guided on guide rods 112. The ledge 111 may be raised by means of chains 113 and chain-rollers 114 and 115 by a shaft 116 during the rotation of the latter. The rotation of the shaft is effected by a lever 119, the short arm 118 of which is provided with a roller 117. By a notch in a disc 120 is effected the adjustment of the lever 119 into the position shown in dotted lines in Fig. 23, and this produces, by means of the chain 113 passing round the pulley 115, the rotation of the shaft 116 and the raising and lowering of the guiding passages 110.

The filling of the magazine compartment is effected by replacing the empty magazine by a filled magazine.

In the accompanying drawings the present machine is illustrated in a constructional form in which, during one working stroke, after the adjustment thereof, by the rotating of the hand crank 9, a set consisting of a predetermined number of bobbins can be changed at once, and the machine for serving a row of spindles comprising in the usual manner about two hundred and forty bobbins must be shifted in steps. Obviously the auxiliary machine can be built for a considerably larger set of bobbins, even for the entire breadth of the water frame if desired, and in the latter case need not be movable, but may be secured to the water frame. Moreover the drive for the machine serving the entire table of spindles may not be effected by a hand crank but by a drive preferably mechanically actuated.

What is claimed as new is:

1. A doffing and donning apparatus for the spindles of spinning machines, including a carriage, means for guidably supporting the carriage on the frame of the spinning machine, grippers for the filled bobbins, means whereby the grippers may be moved to a position to engage the bobbins, means for causing the grippers to grip the bobbins, means for raising the grippers with the filled bobbins to a plane above the spindles of the spinning machine, means for opening the grippers to release the filled bobbins,

and a thread deflector mounted for swinging movement, and means operative in the advancing movement of the grippers to swing the thread deflector into a path to deflect the thread from above the filled spindles into a plane beyond reach of the grippers.

2. A doffing and donning apparatus for the spindles of spinning machines, including a carriage, means for guidably supporting the carriage on the frame of the spinning machine, grippers for the filled bobbins, means whereby the grippers may be moved to a position to engage the bobbins, means for causing the grippers to grip the bobbins, means for raising the grippers with the filled bobbins to a plane above the spindles of the spinning machine, means for opening the grippers to release the filled bobbins, a thread deflector operative in the advancing movement of the grippers to deflect the thread from above the filled spindles into a plane beyond reach of the grippers, and an anti-ballooning push-off device operating in the movement of the thread deflector to repel the anti-ballooning separators of the spinning machine.

3. An apparatus as claimed in claim 1, wherein the thread deflector comprises arms mounted for unitary movement toward and from the spindles of the spinning machine, and a wire of sinuous form connecting the free ends of the arms.

4. An apparatus as claimed in claim 1, wherein the grippers are carried on a frame mounted for vertical movement in the apparatus, the grippers including gripping elements, and a toggle lever connection between said elements and frame.

5. A doffing apparatus for use in removing filled bobbins from the spindles of spinning machines, including a carriage designed to be arranged in front of the spindles to be doffed, a gripper for each bobbin, two frames arranged in superimposed relation on the carriage, means for advancing said frames simultaneously in a horizontal direction toward the filled bobbins, gripper operating mechanism connected to the respective frames and movable therewith to position the grippers in proper relation to the filled bobbin, means for elevating the uppermost frame to cause the grippers to embrace the filled bobbin and simultaneously lift said bobbin from the spindle, and means for lowering the uppermost frame to release the gripper cooperation with the filled bobbin to free said bobbin.

6. A doffing and donning apparatus for the bobbins of spinning machines, including a carriage movable lengthwise the frame of the spinning machine, doffing mechanism including frames movable transversely of the carriage to a position above the bobbins to be doffed, gripper mechanism carried by said

frames including grippers to be positioned on opposite sides of the bobbin to be doffed in the transverse movement of the frames, means for locking the frames in operative position, and means for elevating one of the frames with respect to the other to cause the gripping elements to engage the filled bobbin.

7. A doffing and donning apparatus for the bobbins of spinning machines, including a carriage movable lengthwise the frame of the spinning machine, doffing mechanism including frames movable transversely of the carriage to a position above the bobbins to be doffed, gripper mechanism carried by said frames including grippers to be positioned on opposite sides of the bobbin to be doffed in the transverse movement of the frames, means for locking the frames in operative position, means for elevating one of the frames with respect to the other to cause the gripping elements to engage the filled bobbin, means for releasing the lock of the projected frame at the limit of upward movement of said frame, and means to automatically return the frame to normal position, said frame in its return movement releasing the cooperation of the gripping elements on the filled bobbin to free the bobbin.

8. In a doffing and donning apparatus for bobbins of spinning machines, including a carriage, means for supporting the carriage in fixed relation to the spindles of the spinning machine, an empty bobbin magazine arranged at the upper end of the carriage, means for supporting the empty bobbins in a row in said magazine, means operative when free to act to advance the bobbins of said row, means normally holding the bobbins against advance movement, a guide for the bobbins arranged in advance of the magazine, means for reciprocating the guide, means for operating the bobbin holding means in the movement of the guide to thereby free the foremost bobbin, means for releasing the foremost bobbin for movement in the guide for delivery to the spindle, and means for forcing the bobbins into final positions on the spindles following the delivery of said bobbins from the guide.

In testimony whereof I affix my signature.
BOLESлав EVCHICHEVITZ.