

Oct. 1, 1946.

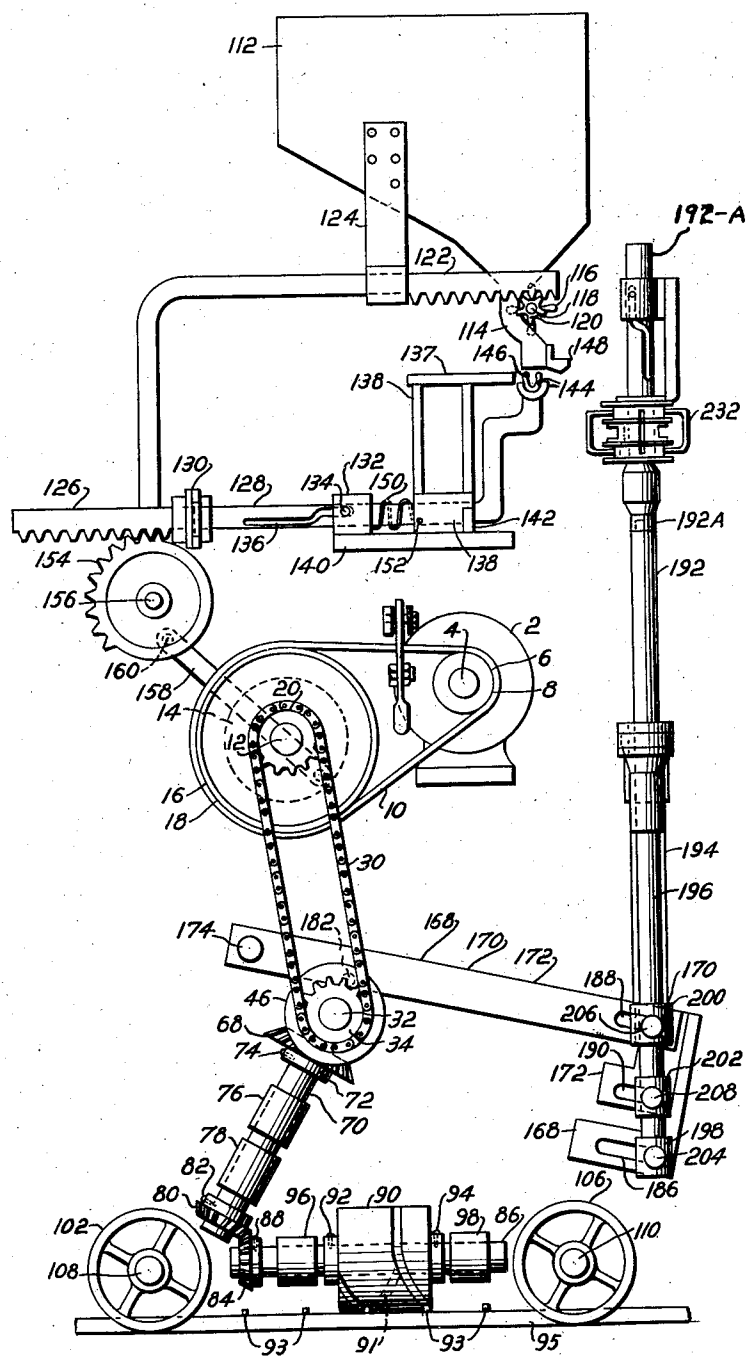
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2,408,587

TEXTILE MACHINERY

Filed Jan. 11, 1945

3 Sheets-Sheet 1



INVENTOR

Fig. 1.

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3 Sheets-Sheet 2

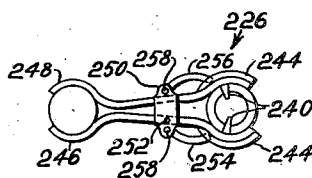
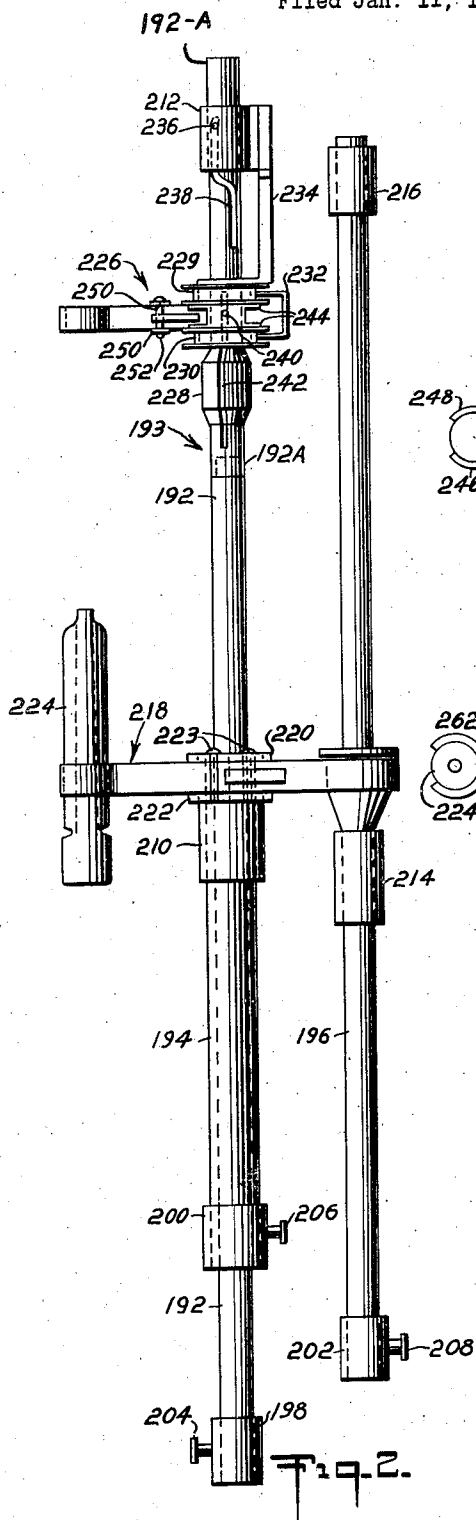


Fig. 3.

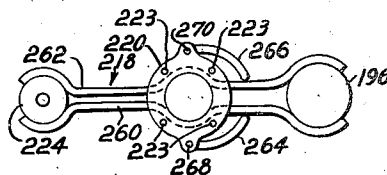


Fig. 4.

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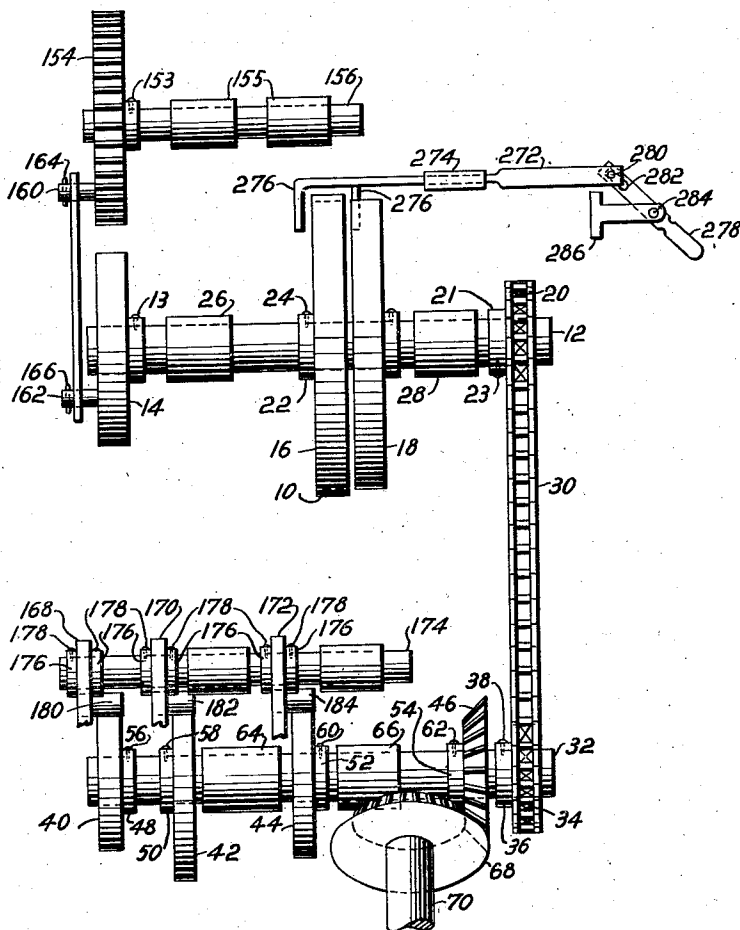


Fig. 5.

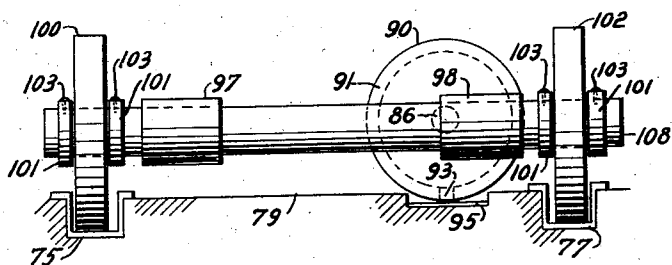


Fig. 6.

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TEXTILE MACHINERY

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Application January 11, 1945, Serial No. 572,320

12 Claims. (Cl. 57—53)

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This invention relates to textile manufacturing and more particularly to a means for doffing spinning frames. In the manufacturing of textiles for the past few decades it has been common practice to doff spinning frames by hand. That is, spinning frames are run until the bobbin on each spindle of the spinning frame has the desired amount of yarn on it, then the frame is completely stopped and each bobbin of yarn is removed by hand one at a time and an empty bobbin is placed by hand on the spindle to be filled with yarn. After all the full bobbins have been removed and empty bobbins have been placed on the spindles the spinning frame is again started and run until the empty bobbins have been filled with yarn and the process of doffing the frame is repeated. This process goes on continuously in many textile mills and is a very costly and laborious process. It usually takes between ten and twenty minutes to doff a frame and while the process of doffing is being carried out, no production is being made as it is necessary to stop the frame before it can be doffed. Spinning frames are built in such a manner that the spindles which rotate the bobbins are so close to the floor that the workmen who doff the frames find it necessary to work all day in a stooped position. After years or even months of working in this stooped position many of the workmen ruin their physique by becoming hump-backed or stoopshouldered.

It is an object of this invention to perform the process of doffing in a more rapid manner by the use of machinery than is possible to do so by hand.

Another object of this invention is to keep the spinning frame in production more hours per day and therefore increase the mill output of yarn or decrease the number of spinning frames necessary for the desired production.

Another object of this invention is to reduce the number of workmen necessary to perform the operation of doffing and therefore reduce the manufacturing costs and increase the company profits.

Another object of this invention is to provide a means of doffing whereby the performance of the operator will not be hazardous or injurious to the workers' physical being.

Other objects and advantages of this invention will be more readily seen and understood after an understanding of the following description and accompanying drawings:

Figure 1 is a side elevation view of the invention.

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Figure 2 is an end view of the shafts taken from Figure 1 which simulate the motions made when the doffing procedure is performed by hand.

Figure 3 is a top view of the upper bobbin holder shown on the shaft in Figure 2.

Figure 4 is a top view of the lower bobbin holder shown on the shaft in Figure 2.

Figure 5 is an end view showing the cams and mechanism used to operate the doffing machine.

Figure 6 is an end view of the mechanism used to perform the positive motion of moving the doffing machine from one spindle to another and holding the doffing machine in the required exact and stationary position while the doffing process is being performed by the doffing mechanism.

For the benefit of clearness the frame work which supports the elements of the invention and the bearings are not shown on the drawings and are not claimed as a part of the invention.

In the process of doffing a spinning frame it is necessary, after the bobbins have been filled with yarn, to lower the traverse rail to the lower part of the bobbin and allow the yarn to be wound several times around this portion of the bobbin before the frame is brought to a stop.

After the frame is stopped, the doffer in the process of doffing the machine takes a hold on the bobbin with his right hand above the lower part of the bobbin where the yarn has been wound on the bobbin last. As the doffer lifts the bobbin from the spindle, yarn is pulled off the lower portion of the bobbin and the upward movement of the bobbin causes the yarn to be unwound from the lower portion of the bobbin onto the

spindle. The full bobbin of yarn is completely removed from the spindle and while it is still held in the doffer's right hand, an empty bobbin is forced onto the spindle by the left hand. As the bobbin is forced onto the spindle, it causes the

yarn that has been previously wound around the spindle to become wedged between the bobbin and the spindle. A slight jerk on the full bobbin held in the right hand will then cause the strand of yarn to break and thus free the full bobbin of yarn from the spinning frame. Also, by wedging the yarn between the bobbin and the spindle, the yarn will be firmly held at one end so that the process of spinning the yarn onto the bobbin may be continued when the spinning frame is again put into operation.

The above description of the motions performed during the process of doffing a spindle is well known among those trained in the art of textile manufacturing and is only given here to

illustrate the invention.

It is to be understood that the invention is not limited to the specific details shown and described herein.

What is claimed is:

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show that the movements described above are simulated in this invention.

In Figure 1 is shown the motor 2 which contains shaft 4 on which is carried pulleys 6 and 8. Pulley 8 drives shaft 12 by means of belt 10. On shaft 12 are securely mounted pulleys 14, 18 and 20 (see Figure 5) by means of hubs and set screws. Also mounted on shaft 12 is pulley 16 which is free to rotate around shaft 12 and is held in its proper place along the shaft by guide 22 which is firmly attached to shaft 12 by set screw 24. Bearings 26 and 28 support shaft 12 and its pulleys. Pulley 20 which is secured to shaft 12 by means of its hub 21 (see Figure 5) and set screw 23 drives chain belt 30 which in turn drives shaft 32 by means of pulley 34 which is firmly attached to shaft 32 and held in place by hub 36 and set screw 38. Shaft 32 has firmly mounted on it, cams 40, 42 and 44 and bevel gear 46 having hubs 48, 50, 52, and 54; and set screws 56, 58, 60 and 62 respectively, which hold them firmly attached to shaft 32. Bearings 64 and 66 support shaft 32 and its cams and pulley and bevel gear. Bevel gear 46 meshes with bevel gear 68 which is rigidly attached to shaft 70 and held by hub 72 and set screw 74. Shaft 70 is supported by thrust bearings 76 and 78 and also has firmly attached to it bevel gear 80 which is held in place by set screw 82.

Bevel gear 80 meshes with bevel gear 84 which is rigidly mounted on shaft 86 by means of set screw 88. Cylindrical cam 90 is firmly attached to shaft 86 and held in place by set screws 92 and 94. Thrust bearings 96 and 98 support shaft 86 and cam 90 and bevel gear 84. Wheels 100, 102 and 104, 106 mounted on shafts 108 and 110 respectively, support the entire machine.

Also shown in Figure 1 is the empty-bobbin box 112 having throat 114, through which the empty bobbins pass, and agitator 116 which is mounted on shaft 118. Shaft 118 is made to rotate clockwise and then counterclockwise by means of gear 120 and reciprocating rack 122. Rack 122 reciprocates through guide 124 which is secured to bobbin box 112. The angularly bent extension of rack 122 is secured to rack 126 by fusion welding or other suitable means. Rotatably connected to rack 126 is arm 128 by means of union 130. Arm 128 extends through bearing 132 which contains pin 134 which fits into groove 136 on arm 128. Member 138 is slidably mounted on platform 140 which supports bearing 132 and stop piece 142. Arm 128 also extends loosely through member 138. The bent extension of arm 128 carries bobbin holder 144 which in turn carries the leaf spring 146 which holds the bobbin after it passes through throat 114. Bumper 148 forces the bobbin into spring 146 as arm 128 moves laterally under the bumper. Spring 150 is attached to bearing 132 and member 138. Bearing 132 is rigidly attached to platform 140, therefore, spring 150 causes member 138 to move horizontally until stud 152 on member 138 reaches stop 142; this movement causes the upper platform 137 on member 138 to slide underneath the opening of the throat 114 when bobbin holder 144 is not under the throat opening. Rack 126 is reciprocated by means of gear 154 which is supported by shaft 156. Gear 154 is made to rotate clockwise then counterclockwise by means of connecting rod 158 which is rotatably connected to gear 154 and gear 14 by means of studs 160 and 162 and held in place by pins 164 and 166 respectively (see Figure 5).

Arms 168, 170 and 172 are rotatably mounted

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on shaft 174 and are held in place on the shaft by sleeves 176 and set screws 178 (see Figure 5). Firmly attached to arms 168, 170 and 172 by welding or other suitable means are studs 180, 182 and 184 which are followers of cams 40, 42 and 44 respectively. Arms 168, 170 and 172 contain slots 186, 188 and 190 respectively and are connected to shafts 192, 194 and 196 (see Figure 2) by means of sleeves 198, 200 and 202 and studs 204, 206 and 208 respectively. Shafts 192, 194 and 196 are more clearly seen in Figure 2.

In Figure 2 are shown shafts 192, 194 and 196. Studs 204, 206 and 208 are securely fastened to sleeves 198, 200 and 202 which are secured to shafts 192, 194 and 196 respectively, by welding or other suitable means. Shaft 192 slides smoothly within hollow shaft 194 and both shafts are guided by fixed sleeves 210 and 212. Shaft 196 is guided in its movements by stationary sleeves 214 and 216. The lower bobbin holder 218 is suitably attached to shaft 194 and held in place on the shaft by sleeves 220 and 222 and through bolts 223. One end of lower bobbin holder 218 fits onto a bobbin of yarn 224 on the spinning frame and the other end embraces shaft 196 which is so designed to act as a cam and cause bobbin holder 218 to grip or release the bobbins, whichever may be desirable at the proper time in the operation of doffing the spinning frame. The upper portion, 192—A, of shaft 192 at point 193 becomes separate and is so designed that the upper part, 192—A, may rotate about and on the lower part. The top part of the lower portion of shaft 192 is reduced in diameter to fit the hollow part at point 193 of the upper portion, 192—A, of shaft 192 which permits the top portion, 192—A, of shaft 192 to rotate on the lower portion of shaft 192. The upper bobbin holder 226 (shown in Figure 3) embraces the upper portion, 192—A, of shaft 192, and the enlarged portion 228 of shaft 192 acts as a cam to cause bobbin holder 226 to grip or release the bobbin of yarn 224 after the bobbin has been raised above the spindle by bobbin holder 218 and shaft 194. Upper bobbin holder 226 is vertically stationary and does not move vertically with shaft 192. Bobbin holder 226 is held vertically in place by sleeves 229 which are rigidly held together by connectors 232 and held vertically in place by arms 234 which are rigidly connected to sleeve 212 by fusion welding or other suitable means. Sleeve 212 has firmly connected to its inner side stud 236 which fits into the groove 238 on shaft 192. Also bobbin holder 226 has firmly connected to its inner side studs 240 which fit into groove 242 on shaft 192. As shaft 192 is moved upward (by cam action explained later) groove 238 and stud 236 will cause the upper portion, 192—A, of shaft 192 to rotate approximately 90 degrees; during the same time the enlarged portion 228 will enter into its proper place in bobbin holder 226 causing the bobbin holder to grip the bobbin of yarn, and as the upper portion, 192—A, of shaft 192 is rotated, stud 240 which is attached to the bobbin holder and fits into groove 242 will cause bobbin holder 226 to rotate with the upper portion, 192—A, of shaft 192.

Bobbin holder 226 has flanges 244 which permit the holder to open and close its grip and still be held in place by sleeves 229 and 230.

In Figure 3 is shown the upper bobbin holder 226 having prongs 246 and 248. Plates 250 are welded to prong 248 and are rotatably connected to prong 246 by pin 252. Leaf springs 254 and 256 are attached to plates 250 by means of pins

258. The springs 254 and 256 are so designed to apply enough pressure to prongs 246 and 248 to keep the lugs 240 within their grooves 242.

In Figure 4 is shown lower bobbin holder 218 having prongs 260 and 262 which are held in place by sleeves 220 and 222 and pins 223. Leaf springs 264 and 266 are firmly attached to pins 268 and 270 respectively. The springs 264 and 266 are designed to apply enough pressure to prongs 260 and 262 to cause the proper parts to fit snugly against the shaft 196 and cause the prongs to release bobbin 224 at the proper time.

In Figure 5 is shown shaft 156 supported by bearings 155. Gear 154 is securely fastened to shaft 156 by means of set screw 153. Pulley 14 is securely mounted on shaft 12 and held in place by means of set screw 13.

Shipper 272 is held and supported by bearing 274 which permits shipper 272 to slide horizontally. Prongs 276 of shipper 272 make contact with the leather belt 10 and cause belt 10 to travel either on fixed pulley 18 or loose pulley 16. Shipper handle 278 is attached to shipper 272 by means of stud 280 and slot 282; the shipper handle 278 is rotatably mounted on stud 284 which is securely attached to support 286 by welding or other means.

Also Figure 5 more clearly shows the cams 40, 42 and 44 which operate and control the actions of arms 168, 170 and 172 by means of stud followers 180, 182 and 184 respectively.

By means of shipper 272 and idler pulley 16; motor 2 may be allowed to run without operating the doffing mechanism. As long as belt 10 is traveling on idler 16, shaft 12 will not rotate. At the proper time, by use of shipper 272, belt 10 can be made to travel on pulley 18 and thus cause the doffing mechanism to operate.

In Figure 6 is shown shaft 198 having wheels 100 and 102 securely mounted thereon and held in place by collars 101 and set screw 103. Bearings 97 and 98 mounted on shaft 198 support the framework of this embodiment of this invention.

Shaft 86 is shown having cylindrical cam 90 securely mounted thereon. Cylindrical cam 90 has groove 91 formed on its surface into which stud 93 fits. Stud 93 is firmly attached to plate 95 by welding or other means and the plate 95 is held in the recessed portion of the floor. Cam 90 is so designed that as it rotates, stud 93 comes into contact with groove 91, this causes the whole machine to move forward until the straight portion of the groove (see Figure 1) comes into contact with stud 93. While the straight portion of the groove is in contact with stud 93 the machine will move neither forward nor backward and requires no brake mechanism to hold the machine in the desired position. Stud 93 has the same spacing as the spindles on the spinning frame. By means of the studs and the cylindrical cam, the doffing machine is moved from one spindle to the next and is stopped at each spindle just long enough for the doffing mechanism to remove from the spindle, the full bobbin of yarn and replace it by an empty bobbin. Wheels 100 and 102 are shown on tracks 75 and 77 which form recesses in the flooring 79.

The motor is driven from D. C. or A. C. source using an overhead trolley line from which the current may be taken and using the track 77 as a ground. This means of transmitting current is old in the art and is not claimed as a part of the invention.

In operation, the spinning frame will be stopped

and the doffing machine will be on its tracks along the length of the frame and motor 2 may be started by making proper contact with the electric source. At the beginning of the doffing procedure, shafts 192, 194 and 196 will be just in line with the first spindle on the spinning frame, bobbin holder 218 will be in a position just over the top of the first bobbin and lever cam 196 will be in the proper position to cause the front jaws of bobbin holder 218 to be open. Cylindrical cam 90 will be in such a position that pin 93 will have just entered the straight portion of groove 91 and will hold the doffing machine in a horizontally stationary position during the process of doffing the first bobbin.

Shipper handle 278 may be lowered and cause shipper 272 to place belt 10 on pulley 18. Shaft 12, on which pulley 18 is rigidly mounted, will be forced to rotate in counterclockwise direction. The motion of shaft 12 is transmitted to shaft 32 by means of chain belt 30 and gears 28 and 34. As shaft 32 rotates, cams 40, 42 and 44 will act against levers 168, 170 and 172 respectively, and cause shafts 192, 194 and 196 respectively, to be raised or lowered in a vertical position. Bevel gear 46 will transmit power to shaft 70 by means of bevel gear 68 which in turn will transmit power to shaft 86 by means of bevel gears 82 and 84.

Each time shaft 12 makes a revolution it will cause gear 154 to make a partial revolution in a clockwise and then a counterclockwise motion. This will cause arms 128 and 122 to move forward and backward in a horizontal direction. As arm 122 moves it will cause, by means of gear 120 and shaft 118, the agitator 116 to rotate clockwise and counterclockwise and aid the empty bobbins in their passage through throat 114. As arm 128 is moved forward, pin 134 and groove 136 will cause bobbin holder 144 to rotate approximately 90 degrees and place an empty bobbin just over the top of an empty spindle on the spinning frame.

As cam 42 lowers rod 194 and bobbin holder 218, the open jaws of bobbin holder 218 pass along the outside edges of the full bobbin of yarn 224. Cam 42 lowers holder 218 until it is at a position about 1½" above the bottom portion of the yarn. When holder 218 reaches the above described position, cam 44 lowers lever 172 and shaft 196 until the enlarged cam portion of shaft 196 fits into the rear jaws of holder 218 and causes the front jaws to close and grip bobbin 224. Immediately after the holder 218 has a firm grip on bobbin 224, cams 42 and 44 act simultaneously to raise rods 194 and 196 upward. Bobbin holder 218 is attached to rod 194 and is therefore raised upward and removes bobbin 224 from its spindle. Rods 194 and 196 are raised at the same speed in order that the enlarged cam portion of rod 196 may not allow holder 218 to lose its grip on bobbin 224. As bobbin 224 is raised upwards, yarn from the lower portion of the bobbin will be reeled off the bobbin and will entwine itself around the spindle.

Bobbin 224 will be raised until it has entered the open jaws of bobbin holder 226, and will be held in this raised position until cam 40 has raised lever 168 and shaft 192 into such a position that the enlarged cam portion 228 of shaft 192 has entered the rear jaws of bobbin holder 226 and has caused the front jaws of bobbin holder 226 to have a firm grip on bobbin 224. At this stage, cam 44 causes shaft 196 and its enlarged cam portion to move further upward in order to allow bobbin holder 218 to release its grip on

bobbin 224. By this time, cam 40 has caused shaft 192 to move high enough that the curved portion of groove 238 has reached pin 236. Further raising of shaft 192 will cause, by means of groove 238 and pin 236, the upper portion, 192-A, of shaft 192 and bobbin holder 226 to rotate approximately 90 degrees and move bobbin 224 out of the way so that an empty bobbin may be placed on the spindle from which bobbin 224 was removed.

When bobbin 224 has been moved out of the way, rod 128 is moved forward according to the previous description of its movement and an empty bobbin held by spring gripper 146 in bobbin holder 144 is moved from bobbin box 112 to its position just over the empty spindle. When the empty bobbin is placed over the spindle, bobbin holder 218 which has just released bobbin 224 is in position to grasp the empty bobbin. Cam 44 lowers shaft 196 and its enlarged cam portion causes bobbin holder 218 to firmly grip the empty bobbin, then cams 42 and 44 simultaneously lower shafts 194 and 196 respectively, which causes the empty bobbin to be placed on the spindle. As the empty bobbin is placed on the spindle, the yarn, which is entwined around the spindle and connected to the bobbin or yarn that has just been removed, will become wedged between the spindle and the inside of the empty bobbin. Further lowering of the empty bobbin will break the yarn and release the full bobbin of yarn 224 from the spinning frame. While the empty bobbin was being placed on the spindle, the full bobbin 224 was being held by bobbin holder 226, and cam 40 was causing shaft 192 to be moved in an upward direction and groove 238 and pin 236 was causing bobbin holder 226 and bobbin 224 to be rotated approximately 90 degrees. As soon as the empty bobbin is placed on the spindle and the thread broken as previously described, cam 40 will cause shaft 192 to be raised further until the enlarged cam portion of shaft 192 has passed through the rear jaws of bobbin holder 226. This movement will allow bobbin holder 226 to release bobbin 224 which may be dropped into a bobbin box. By this time cam 44 will cause shaft 196 to move upward and allow bobbin holder 218 to release the empty bobbin, then cams 42 and 44 will simultaneously raise shafts 194 and 196 respectively, until they are in the proper position to doff the next bobbin. Also, cam 40 will allow shaft 192 to be lowered and cause bobbin holder 226 to rotate back to its normal position to assist in the operation of doffing the next bobbin. By the time that the bobbin holders 218 and 226 are in the above described positions, cylindrical cam 90 will have rotated until the curved portion of groove 91 has reached pin 93. Further rotation of shaft 86 and cylindrical cam 90 will cause the doffing machine to be moved to the next spindle where the entire doffing procedure will be repeated.

In order to expedite the doffing of a spinning frame, one of the above described doffing machines may be used on each side of the spinning frame which will facilitate the doffing procedure and allow the spinning frame to be quickly placed again into production.

While the embodiment illustrated on the drawings has been described with considerable particularity, it is to be expressly understood that the invention is susceptible of many embodiments without departing from the spirit of the invention, and reference is therefore to be had to the appended claims for a definition of the invention.

What is claimed is:

1. In combination with a spinning machine, having conveyor tracks alongside the frame, a doffing device comprising, an empty bobbin container, an arm and bobbin holder for transferring empty bobbins from said empty bobbin container to a position directly over a spindle of said spinning machine, a second arm and bobbin holder to doff the spindles of said spinning machine, a third arm and bobbin holder to remove the full bobbins of yarn from the grasp of said second bobbin holder, and a cylindrical cam for conveying said doffing device along said tracks.

2. In combination with a spinning machine, a doffing device comprising, an empty bobbin container, an arm and bobbin holder for transferring empty bobbins from said empty bobbin container to a position directly over a spindle of said spinning machine, a second arm and bobbin holder to doff the spindles of said spinning machine, a third arm and bobbin holder to remove the full bobbins of yarn from the grasp of said second bobbin holder, vertical shafts on which the second and third arms and bobbin holders operate, and cams to operate said second and third arms and bobbin holders on said vertical shafts.

3. In combination with a spinning machine having conveyor tracks alongside the frame, a doffing machine comprising, an empty bobbin container, an arm and bobbin holder for transferring empty bobbins from said empty bobbin container to a position directly over a spindle of said spinning machine, a second arm and bobbin holder to doff the spindles of said spinning machine, a third arm and bobbin holder to remove the full bobbins of yarn from the grasp of said second bobbin holder, vertical shafts on which the second and third arms and bobbin holders operate, cams to operate said second and third arms and bobbin holders on said vertical shafts and a cylindrical cam for conveying said doffing machine along said tracks.

4. In combination with a spinning machine having conveyor tracks alongside the frame, a doffing machine comprising, an empty bobbin container, an agitator for assisting the passage of empty bobbins through the said container, an arm and bobbin holder for transferring empty bobbins from said empty bobbin container to a position directly over a spindle of said spinning machine, a second arm and bobbin holder to doff the spindles of said spinning machine, and a cylindrical cam for conveying said doffing machine along said tracks.

5. In combination with a spinning machine, a doffing machine comprising, an empty bobbin container, an agitator for assisting the passage of empty bobbins through the said container, an arm and bobbin holder for transferring empty bobbins from said empty bobbin container to a position directly over a spindle of said spinning machine, a second arm and bobbin holder to doff the spindles of said spinning machine and a third arm and bobbin holder to remove the full bobbins of yarn from the grasp of said second bobbin holder.

6. In combination with a spinning machine having conveyor tracks alongside the frame, a doffing machine comprising, an empty bobbin container, an agitator for assisting the passage of empty bobbins through the said container, an arm and bobbin holder for transferring empty bobbins from said empty bobbin container to a position directly over a spindle of said spinning machine, a second arm and bobbin holder to doff

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the spindles of said spinning machine, a third arm and bobbin holder to remove the full bobbins of yarn from the grasp of said second bobbin holder, and a cylindrical cam for conveying said doffing machine along said tracks.

7. In combination with a spinning machine, a doffing machine comprising, an empty bobbin container, an agitator for assisting the passage of empty bobbins through the said container, an arm and bobbin holder for transferring empty bobbins from said empty bobbin container to a position directly over a spindle of said spinning machine, a second arm and bobbin holder to doff the spindles of said spinning machine, a third arm and bobbin holder to remove the full bobbins of yarn from the grasp of said second bobbin holder, vertical shafts on which the second and third arms and bobbin holders operate, and cams to operate said second and third arms and bobbin holders on said vertical shafts.

8. In combination with a spinning machine having conveyor tracks alongside the frame, a doffing machine comprising, an empty bobbin container, an agitator for assisting the passage of empty bobbins through the said container, an arm and bobbin holder for transferring empty bobbins from said empty bobbin container to a position directly over a spindle of said spinning machine, a second arm and bobbin holder to doff the spindles of said spinning machine, a third arm and bobbin holder to remove the full bobbins of yarn from the grasp of said second bobbin holder, vertical shafts on which the second and third arms and bobbin holders operate, cams to operate said second and third arms and bobbin holders on said vertical shafts and a cylindrical cam for conveying said doffing machine along said tracks.

9. In combination with a doffing machine,

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means for conveying said machine alongside a spinning frame comprising, a double track, a longitudinal member between said double track, equally spaced lugs mounted on said longitudinal member and a cylindrical cam acting against said lugs to convey said doffing machine with intermittent motion along said double track.

10. In combination with a doffing machine, means for conveying said machine alongside a spinning frame comprising, a double track, a longitudinal member, equally spaced lugs mounted on said longitudinal member, and a cylindrical cam acting against said lugs to convey said doffing machine with intermittent motion along said double track.

11. In combination with a doffing machine, means for conveying said machine comprising a double track, a longitudinal member, equally spaced lugs mounted on said longitudinal member and a cylindrical cam acting against said lugs to convey said doffing machine along said double track.

12. In combination with a spinning frame, a doffing machine comprising, an empty bobbin container, an agitator for assisting the passage of empty bobbins through the said container, an arm and bobbin holder, mechanically operated to transfer the empty bobbins from the bottom of the empty bobbin container to a position directly over a spindle of said spinning frame, a second arm and bobbin holder, cams to operate and cause second arm and bobbin holder to remove the full bobbins of yarn from the spindles of said spinning frame and replace with empty bobbins, and a cylindrical cam to convey the doffing machine with intermittent motion alongside the spinning frame.

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