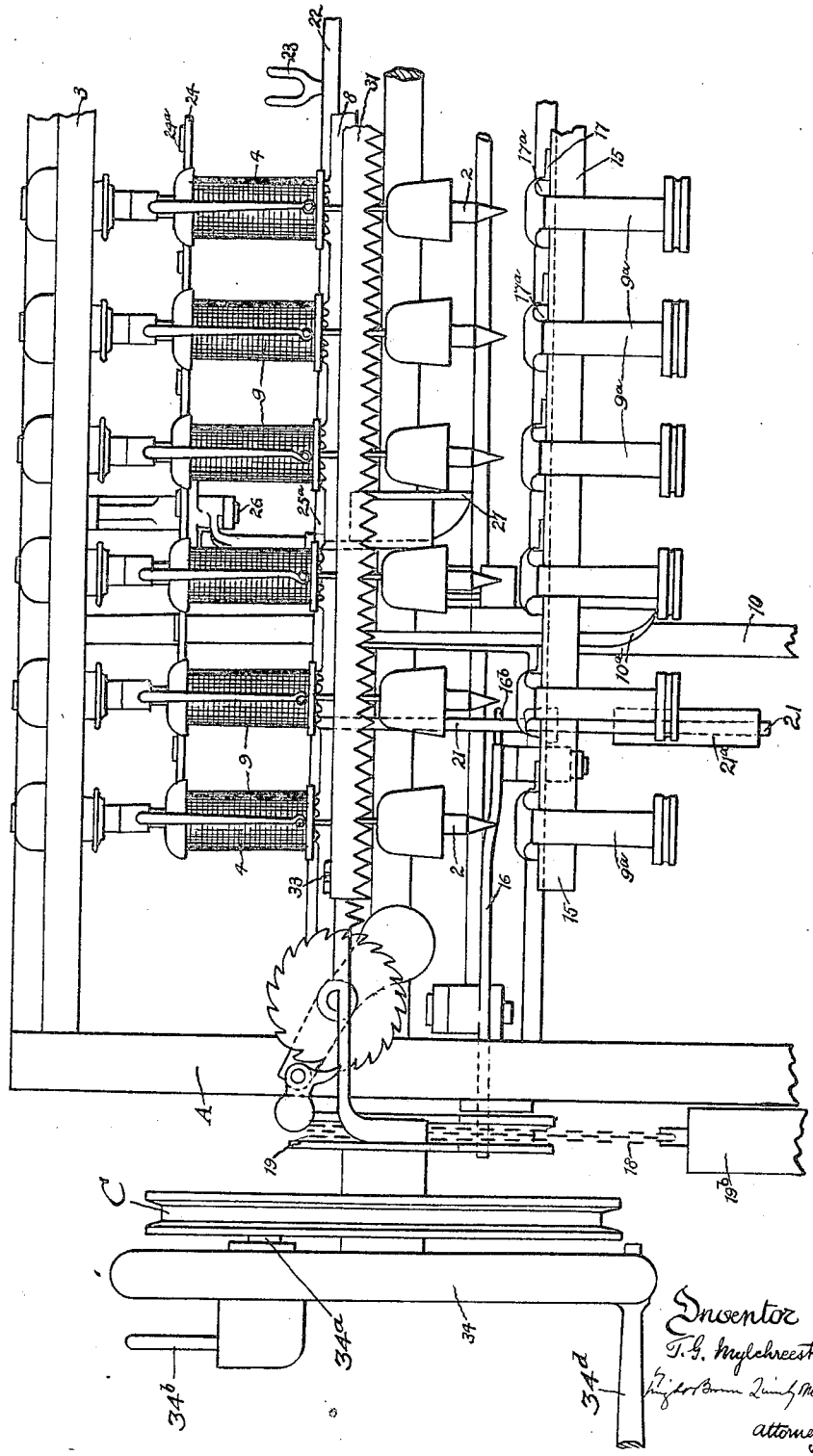
June 5, 1923. 1,457,593

T. G. MYLCHREEST

DOFFING MECHANISM FOR SPINNING AND LIKE MACHINES

Filed Oct. 24, 1917 6 Sheets-Sheet 1

Fig. 1.



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Filed Oct. 24, 1917

6 Sheets-Sheet 2

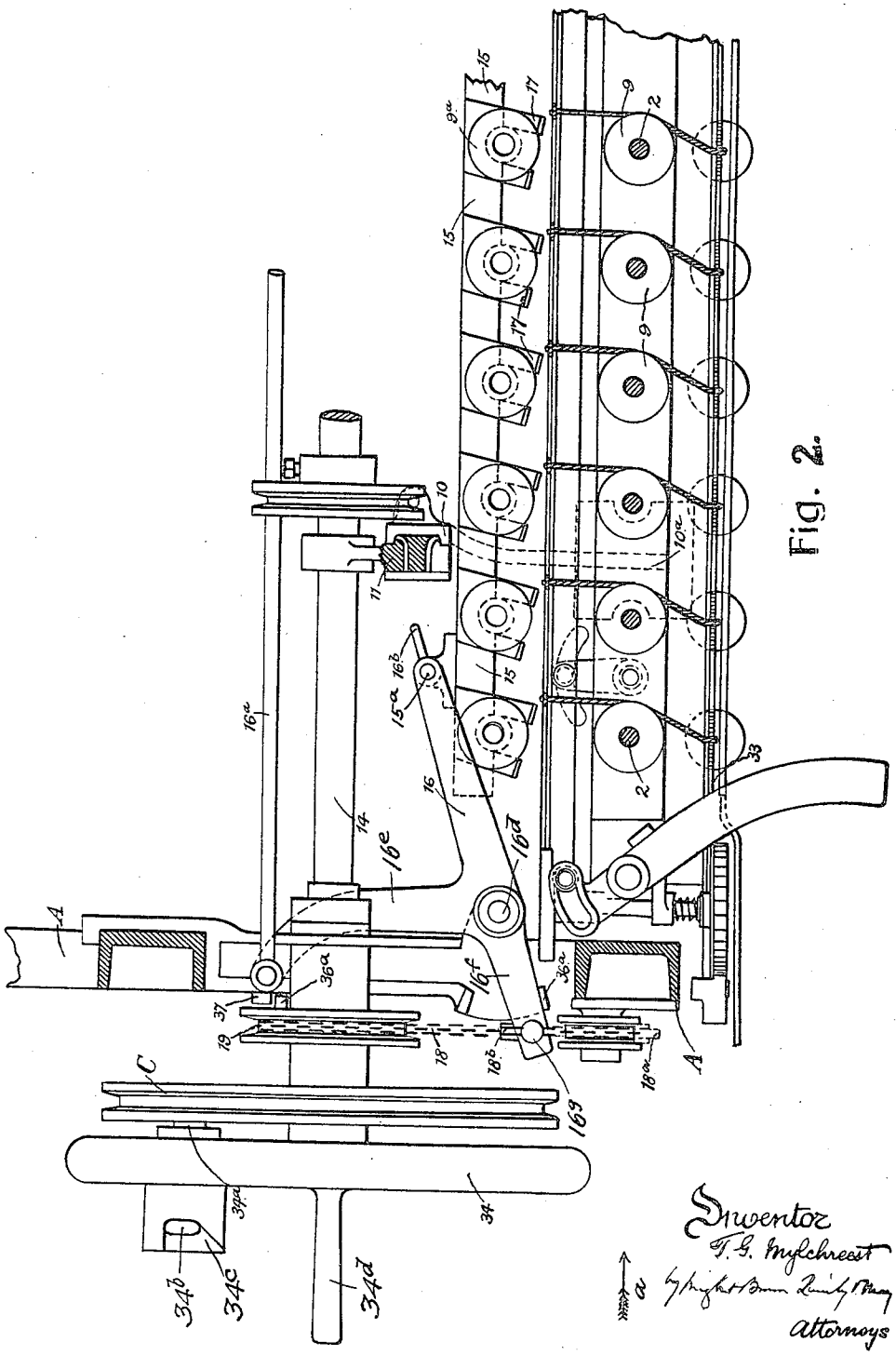

Fig. 2.

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DOFFING MECHANISM FOR SPINNING AND LIKE MACHINES

Filed Oct. 24, 1917

6 Sheets-Sheet 3

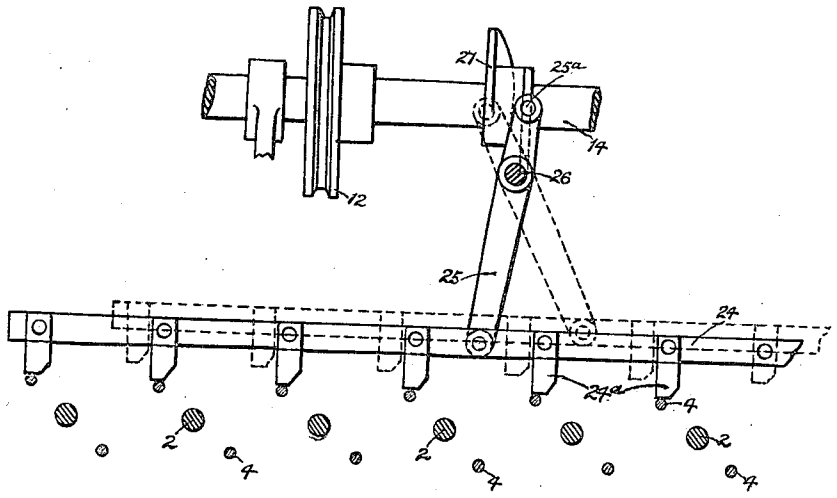
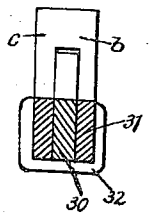


Fig. 3.

Fig. 9.



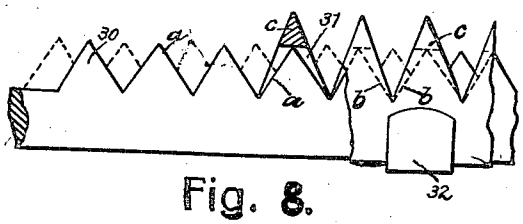


Fig. 8.

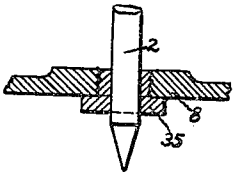


Fig. 10.

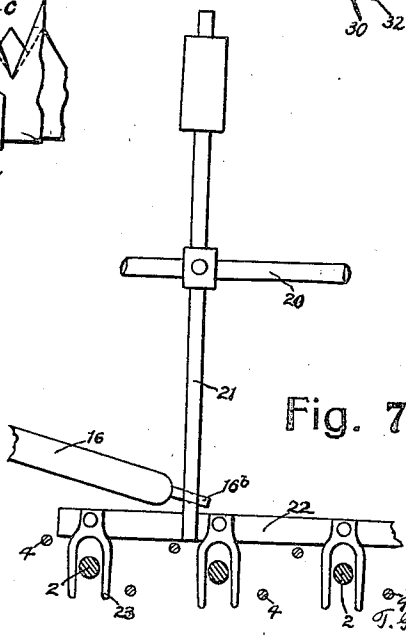


Fig. 7.

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DOFFING MECHANISM FOR SPINNING AND LIKE MACHINES

Filed Oct. 24, 1917

6 Sheets-Sheet 4

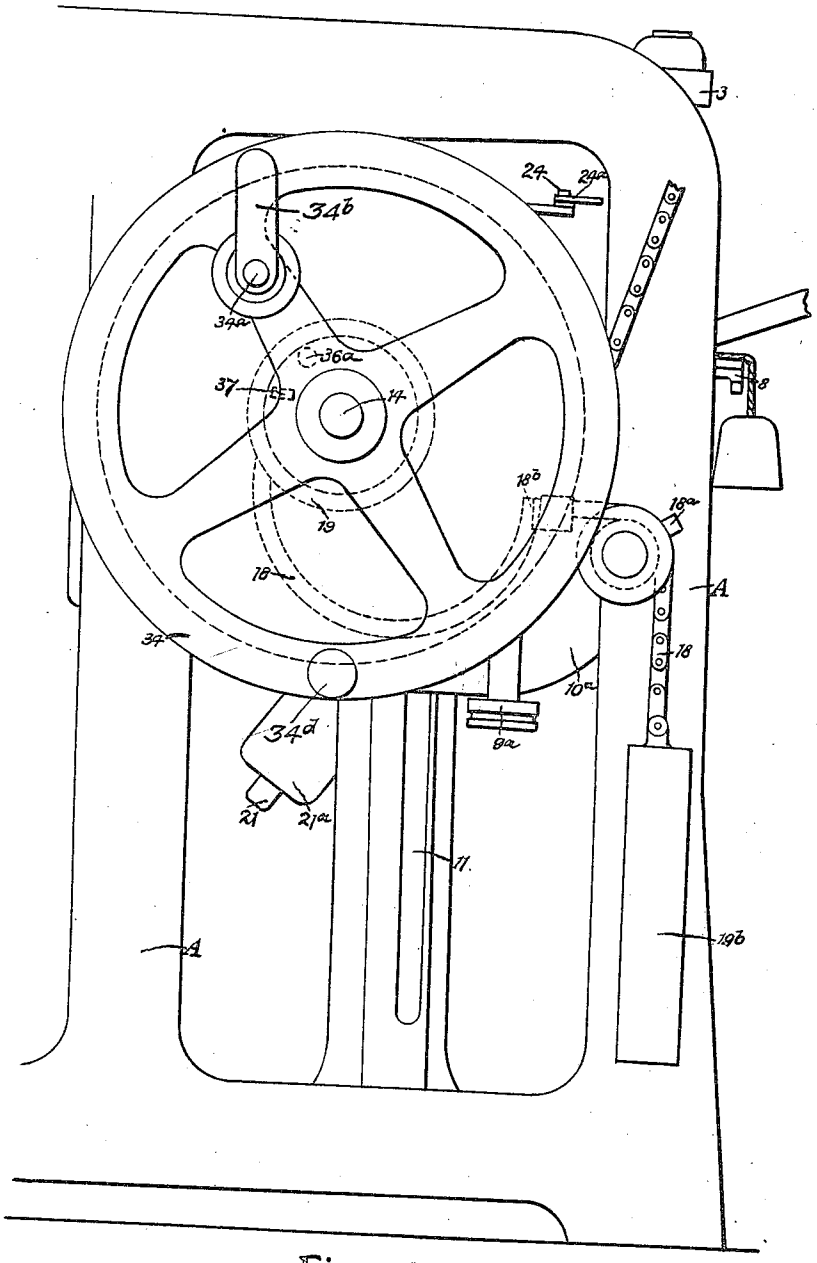

Fig. 4.

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DOFFING MECHANISM FOR SPINNING AND LIKE MACHINES

Filed Oct. 24, 1917 6 Sheets-Sheet 5

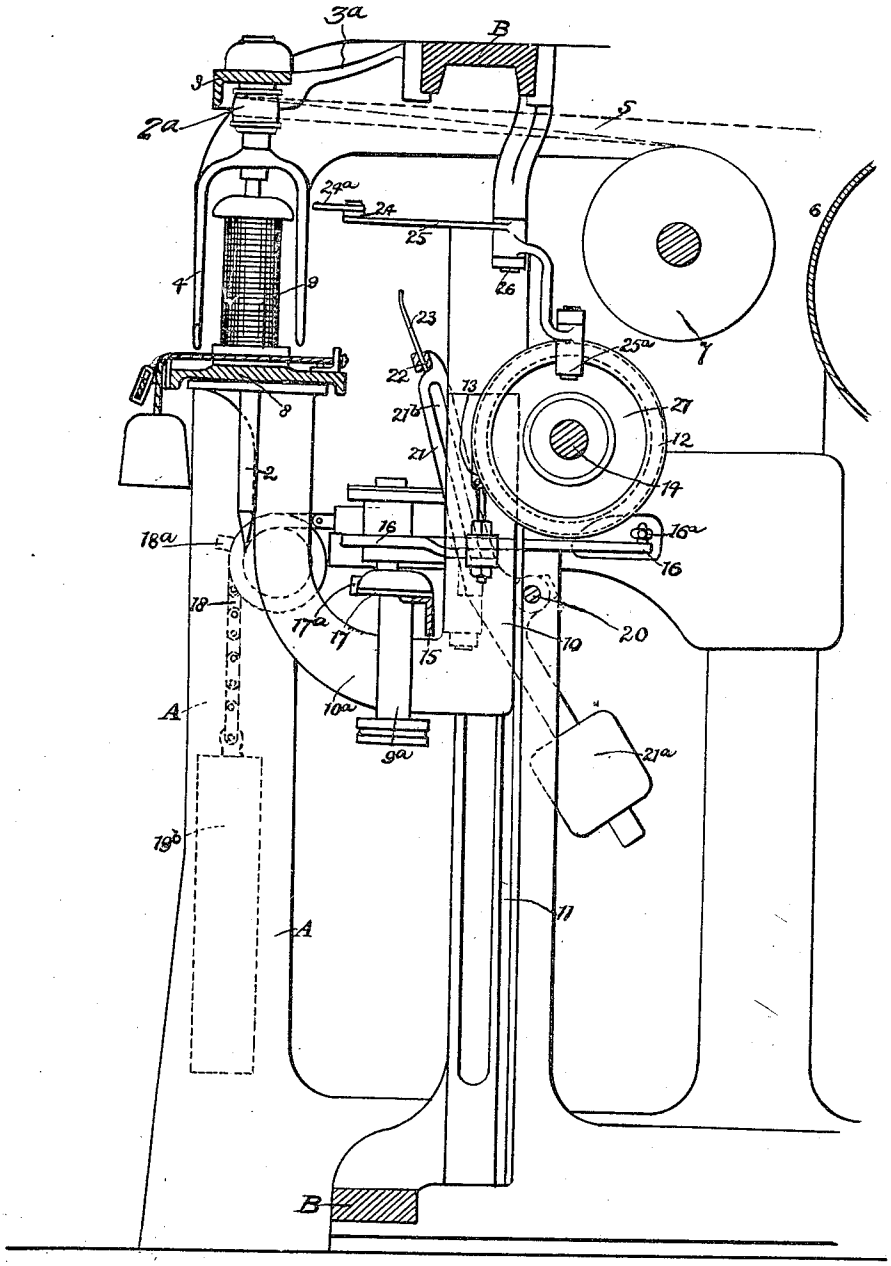

Fig. 5.

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DOFFING MECHANISM FOR SPINNING AND LIKE MACHINES

Filed Oct. 24, 1917 6 Sheets-Sheet 6

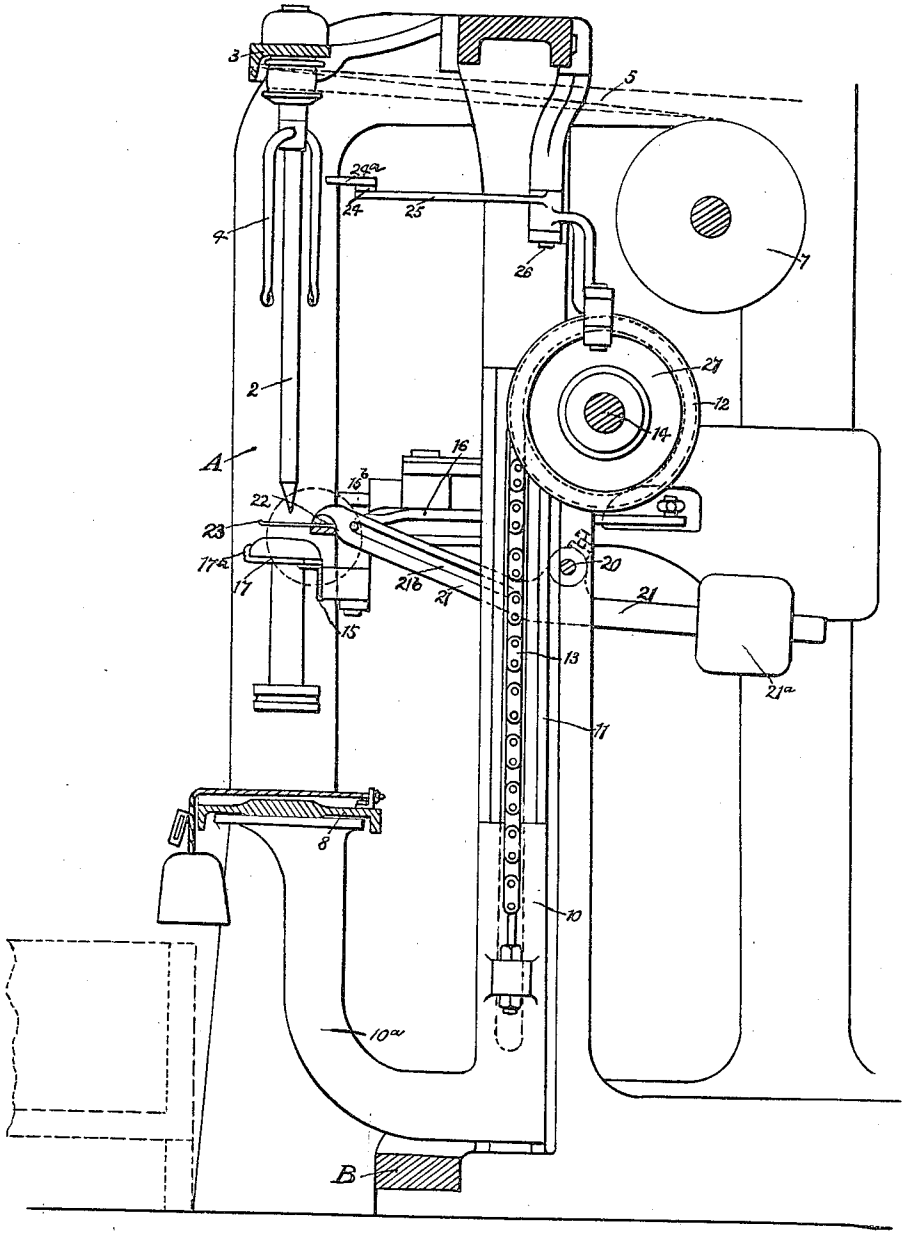

Fig. 6.

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UNITED STATES PATENT OFFICE.

THOMAS GEORGE MYLCHREEST, OF THORNER, NEAR LEEDS, ENGLAND.

DOFFING MECHANISM FOR SPINNING AND LIKE MACHINES.

Application filed October 24, 1917. Serial No. 198,233.

To all whom it may concern:

Be it known that I, THOMAS GEORGE MYLCHREEST, a subject of the King of Great Britain, and resident of "Eltofts," Thorner, near Leeds, in the county of York, England, have invented a certain new and useful Improvement in Doffing Mechanism for Spinning and like Machines, of which the following description, having reference to the accompanying sheets of drawings, is a specification.

It relates to machines for spinning, doubling, twisting and for performing like operations in the production of yarns or threads of fibrous substances in the type of machine known as a "flyer frame"; and consists in an improved construction and arrangement of parts in said machines in order to enable the process of doffing to be readily carried out by the operative, that is to say, to enable said operative by manipulating a simple hand wheel or the like to carry out the process of removing the full bobbins from the spindles by moving the lifter rail beyond the lower extremities of the spindles, adjusting the legs of the flyers, removing from the spindles any coils of yarn that may have encircled same during the descent of the full bobbins, displacing the full bobbins, placing the empty bobbins beneath and into alignment with the spindles and raising the lifter rail to place all the operating parts into their respective positions so that the spinning operations may be recommenced. The cutting or severing of the threads is manually effected after a few coils of yarn have been wound upon the bobbins.

In the accompanying sheets of drawings which are illustrative of my invention.

Fig. 1 is a front elevation of sufficient of a flyer spinning or like frame to illustrate the application of my improved parts, said frame being of that class which is employed in the spinning of jute and wherein drag weights are used in connection with the bobbins.

Fig. 2 is a sectional plan showing certain of the parts illustrated by Fig. 1.

Fig. 3 is also a sectional plan and illustrates the devices which I employ for adjusting the flyers in the desired positions to enable the other parts to operate as hereinafter explained.

Fig. 4 is an end elevation of the parts illustrated by Fig. 2 and as seen in the direction indicated by the arrow *a*.

Fig. 5 is a sectional end elevation of parts shown by Fig. 1, but as seen in the opposite direction to that indicated by arrow *a* and illustrates the several parts in their normal positions during the spinning or like operations of the machine.

Fig. 6 is a similar view to Fig. 5 but illustrates the several parts in certain of their positions during the process of doffing.

Fig. 7 is a sectional plan showing devices used for removing any coils of yarn that may have wrapped or become wound around the lower ends of the spindles.

Figs. 8 and 9 are sectional side and end elevations respectively, illustrating the formation or construction of cutting knife that I make use of.

Fig. 10 is a sectional elevation showing the lateral support for the spindle, said support being mounted in the lifter rail.

A indicates the end frame of the machine and B B the longitudinal rails or bars which together with the end frames A form part of the framework of the machine.

The hand wheel 34 which is fixed upon the shaft 14 actuating the lifter, is the member used (in our present arrangement) for manually effecting the doffing after being disengaged by the coupling 34^a from the ordinary grooved lifter pulley C which is loosely mounted on the said shaft 14. The said shaft 14 is the member used for transmitting movement to the lifter plate 8 to reciprocate same during the building of the yarns on the bobbins 9. This shaft 14 is oscillated by means of a chain connected to the chain pulley C, such chain being operated in the common and well known manner from a heart shaped or other cam rotated from the driving shaft of the machine. This building cam and connections to said pulley C are not shown, as they are well understood by persons conversant with this class of machine. The pulley C is mounted loosely on the shaft 14 and is capable of connection to the wheel 34 (fixed on said shaft 14) by a pin 34^a operated by a handle 34^b passing over a cam surface 34^c. When said pin 34 causes the engagement of the wheels 34 and C the shaft 14 is automatically oscillated to cause oscillation of the lifter plate 8 and the building of the threads on the bobbins 9,

while when said peg 34ª is withdrawn then the shaft 14 may be manually operated by the hand wheel 34, the building cam and its chain and pulley C being then disconnected from the lifter.

I may here observe that as above stated the machine illustrated and in connection with which I have shown my improved doffing mechanism is one wherein weights and cords are used for putting drag upon the bobbins and as these cords have to be removed from contact with the bobbins before the doffing operations commence I make use of devices for this purpose which are fully explained in my British Letters Patent No. 15825/16.

In connection with machines in which said weights and cords are not made use of, then the mechanism which I hereinafter describe and which forms the subject matter of my present invention performs all the doffing operations (except the cutting or severing of the thread) by the manipulations of the simple hand wheel device hereinafter explained.

In carrying my invention into effect I mount the spindles 2 upon the front upper rail 3 which extends from end to end of the machine in such a manner that said rail 3 alone supports the weight of said spindles 2 and their flyers 4.

Motion is transmitted to the spindles 2 by means of the driving tapes 5 which are actuated by the driving cylinder 6 and are kept in a proper state of tension by the well known tension cylinder 7. The rail known as the lifter rail 8 and upon which the bobbins 9 rest during the spinning operations, is arranged to be supported by arms 10ª extending from sliding supports 10 which are mounted upon the vertical guiding rails 11 in order that by connecting said sliding parts 10 to the pulleys 12 by means of the chains 13, on account of said pulleys 12 being fixed to the longitudinal shaft 14 (which extends from one end of the machine to the other and which is counterbalanced by weights in manner well known) the movements of the lifter rail 8 are effected under counterbalanced conditions. The spindles 2 are not supported by foot steps but rely upon their bearings carried by the rail 3 as above stated, yet by the said spindles 2 taking through bushes 35 mounted in the lifter rail 8 they are steadied in their actions and thus undesirable vibrations are not set up.

Beneath the lifter rail 8 and to the rear of same I mount a longitudinal bar 15 upon which are fixed bifurcations 17 having at their outer ends vertical projections 17ª to take beneath and span the upper flanges of the series of empty bobbins 9ª that are arranged to be substituted by the process of doffing for the full bobbins removed from the spindles. The bifurcations 17 span the bodies of the bobbins while supporting same by their flanges as above described, the projections 17ª preventing said bobbins from being displaced except under the conditions hereinafter explained. The longitudinal bar 15 is supported by lever arms 16 fulcrumed at 16ª on the stationary framework of the machine as shown by Fig. 2. These levers may be two, three or more in number in accordance with the length of the spinning frame, and the lever or levers in addition to that shown by said Fig. 2 are only provided with arms 16 and 16ᵉ these arms being respectively connected by pins 15ª to brackets on the bar 15, and to the rod 16ª when one lever 16 is operated so is also the other in order that they may move the rail from its rear position illustrated by Fig. 5, into its advanced position illustrated by Fig. 6, during which movement it follows a curved path in the horizontal plane, and not a straight path as do those bars which are carried by sliding supports.

The movements of the levers 16 in one direction are effected through the medium of the projection 18ª on the operating chain 18 which is secured to and passes beneath a grooved operating pulley 19 fixed upon the lifter shaft 14 while its return movement which is completed when it contacts with the fixed stop piece 36 on the machine's framework is brought about by the falling weight 19ᵇ causing the projection 18ᵇ to press against the end of said lever 16, hence as said shaft is operated so also is the chain 18 actuated. However said chain is made sufficiently long to enable the shaft 14 to move far enough during its oscillations when transmitting motion to the lifter rail for effecting the spinning or like operations without moving the chain 18 more than merely to take out of it a slack portion thereof for the purpose hereinafter explained.

Behind the series of spindles 2 and in suitable proximity thereto I mount a shaft 20 which is supported by bearings carried by the framework of the machine so that it may oscillate thereon as hereinafter explained. Upon this shaft 10 I fix lever arms 21 (only one of such levers being illustrated by the drawings as the others are at other parts of the machine which are not shown) which are arranged to extend somewhat in a vertical direction as shown by Fig. 5 when in their normal inoperative positions. Fixed upon the outer ends of these lever arms 21 is a longitudinal bar 22 which has mounted upon it a series of bifurcated projections or fingers 23 corresponding in number with the number of spindles 2 while the other end of the levers 21 carry a counterbalancing weight 21ª in order that the several parts may be thereby assisted to assume their normal positions where they are held during the ordinary spinning opera-

tions of the machine while when the levers 16 are moved to carry the bar 15 in a forward direction these lever arms 21 are actuated by means of projections 16^b on the levers 16 taking into slots 21^b made in said lever arms 21 said levers are caused to descend bringing with them their bifurcations 23 to travel over a certain portion of the lower ends of the spindles 2.

Mounted above the shaft 20 and to the rear of the series of spindles 2 is a bar 24 carried by two or more lever arms 25 fulcrumed on studs 26 at different parts in the length of the machine, thus said bar which extends from end to end of the machine in order that projections 24^a fixed on said bar 24 and having their outer ends of the shape illustrated by Fig. 3, may come in contact with one or other of the legs of the flyers 4 and so place same in position prior to the descending of the bifurcations 23. The bar 24 is mounted upon lever arms 25 which are pivoted upon studs 26 so that their extending ends 25^a may span or engage with a cam or scroll 27 fixed upon so as to rotate with the lifter shaft 14, the actions of the lever arms 25 being in such a direction as to cause the projections 24^a to travel in a curved path firstly advancing towards the flyers 4 and then moving forward to push the legs of the flyers into such positions as will enable them to afford space or freedom for the advancing of the bifurcations 23 during the process hereinafter explained.

As means for cutting or severing the yarns or threads after the process of doffing is completed and immediately the spinning operations are recommenced I make use of a knife 30 which is of a compound character already well known, but which according to my invention I construct so that its outer grooved part 31 has its groove formed to receive the prepared cutting edges of the knife 30 which cutting edges *a* are of the serrated or toothed character illustrated by Fig. 8. These teeth *a* enter the groove in the bar 31 and said bar 31 has its corresponding edges *b* also serrated or formed with teeth. According to my invention the teeth *b* are joined together at their apexes or upper edges as shown at *c* Figs. 8 and 9 while the lower edges of the part 31 are held together by the member 32 so that on reciprocating the blade 30 within the part 31 any threads that lie crosswise the series of teeth are thereby cut or severed.

The compound knife 31, 31 is hinged upon the lifter rail 8 by the hinges 33, see Fig. 1.

On the process of spinning being completed so that the bobbins have received the full quantity of yarn or thread that has to be wound upon them, the motions of the machine are arrested. The operative after removing the well known coupling 34^a then actuates the hand wheel 34 which is fixed on the outer end of the lifter shaft 14 by rotating same in such a direction as will enable the grooved pulleys 12 to pay out sufficient of the chains 13 to let the lifter rail 8 descend sufficiently far beyond the lower outer ends of the spindles 2 to carry with it the bobbons 9 clear of said lower ends, on which the further descent of the lifter rail will be arrested by an appropriate stop-piece as that 36^a on the pulley 19 which comes into contact with the fixed projecting part 37, said stop piece 36^a during this movement having traversed from the position indicated by Fig. 4 to have almost completed one revolution and have come into contact with the under surface of said fixed projection 37. During the latter part of the rotation of said shaft 14 the projection 18^a on the chain 18 comes into contact with the end of the lever 16 and will commence to actuate the latter in order to move forward the empty bobbins 9^a which are carried by the bifurcations 17 on the rail 15, these latter being moved sufficiently far forward as to enable said empty bobbins to push the full bobbins off the rail 8 from which they will fall into any suitable receptacle beneath as will be understood. Fig. 2, it will be observed, shows the lever 16 in its rear position, and by the chains 18 being wound by passing beneath and around the pulley 19 a portion of said chain 18 will slide through the nut 16^g until the projection 18^a comes into contact with said nut 16^g, on which movement is given to the lever 16 to cause the plate 15 to be projected into its forward position. During the time that the rail 15 is thus being moved forward the bar 22 will have been caused to descend or oscillate about its pivotal shaft 20 by the end 16^b of the lever 16 moving the lever 21 by engaging with the slot 21^b so that the bifurcated projections 23 will be brought to pass over the lower ends of the spindles 2 to remove therefrom any coils of yarn that may have slipped from off the full bobbins to encircle said lower end of the spindles 2. Just prior to the advancing motion of the bifurcations 23, the cam or scroll 27 will have moved the bar 24 so far forward that its projections 24^a will have adjusted the legs of the flyers in such positions as will permit the actions of the bifurcations 23 as above explained to be carried out. When the several parts have thus been moved into their positions by the operative rotating the hand wheel 34 as above described now that the full bobbins will have been removed clear of the lifter rail 8 the operative may then reverse the direction of motion of the hand wheel 34 and cause it to carry all the several parts back to their normal positions;

that is to say, on reversing the direction of motion of said hand wheel the shaft 14 will be rotated and will firstly cause the lifter rail to rise and lift the empty bobbins clear of the projection 17a, thus said empty bobbins merely rest upon the lifter plate 8 and are clear of all other retaining parts ready for the several parts of the doffing apparatus to be restored to their normal position. The bar 15 is then moved backwards this causing the bar 22 to be returned to its normal position, after which the bar is also moved to its rear position. The lifter plate is then further raised to carry the empty bobbins within the flyers so that the spinning operations may be recommenced on which the chain 18 will again be allowed to become slack in order that during the actions of the shaft 14 to carry out the motions of the rail 8 it does not interfere with any of the several parts to which and through which said chain 18 is connected and transmits motion. After the commencing of the spinning operations the yarns are severed as hereinbefore described. This severing of the yarns is effected by the cutting device shown by Figs. 9 and 10, the yarns or threads extending from the discharged full bobbins to the empty bobbins lying across or between one or other of the teeth 30, 31 so that by the reciprocation of one part 30 or 31 over the other, thus severing is effected.

Such being the nature and object of my said invention what I claim is:—

1. In doffing mechanism for spinning, doubling and like machines, a shaft, a member for operating said shaft, means operated from said shaft to displace full bobbins and bring empty bobbins into position, means operated by said shaft to simultaneously move the flyers from the path of means for clearing yarns from the spindles, means operated by said shaft to displace yarns wound around the spindles, and means operated by said shaft for raising the empty bobbins into positions about the spindles.

2. In doffing mechanism for spinning, doubling and like machines, a bobbin lifter plate, a support for empty bobbins, a shaft, a member for oscillating said shaft, a chain wheel fixed on said shaft, a chain connected to said chain wheel, projecting parts mounted on said chain, a lever operated by said projections, connections from said lever to the support for the empty bobbins, and connections from said shaft to a support for the lifter plate.

3. In doffing mechanism for spinning, doubling and like machines, a shaft, a member for operating said shaft, a chain wheel fixed on said shaft, a chain fixed on said chain wheel, a guide pulley for said chain, projections mounted on said chain, a counterbalancing weight carried by said chain, a lever operated in one direction by one projecting part on the chain and in the other direction by the other projection thereon, and an empty-bobbin-carrying plate connected to said lever, and adapted to be moved thereby to effect removal of filled bobbins and proper positioning of the empty bobbins carried thereby.

4. In doffing mechanism for spinning, doubling and like machines, a lifter rail, supports therefor, a shaft mounted in proximity to said supports, guides for said supports, chain wheels fixed on said shaft, chains connecting said supports and wheels, means for automatically oscillating said shaft during spinning operations, means for manually oscillating said shaft during doffing operations, a device for connecting or disconnecting said hand mechanism and power mechanism, means for supporting empty bobbins, a device connected to said shaft for operating said means to cause the empty bobbins to displace full bobbins, and a device operated by these means to move coils of threads from the spindles.

5. In doffing mechanism for spinning, doubling and like machines, spindles, bobbins carried by said spindles, flyers operating in connection with said spindles, a lifter rail for reciprocating said bobbins relatively to the flyers, a shaft, means for operating same by power during spinning operations, means for operating same by hand during doffing operations, connections from said shaft to said lifter plate, connections from said shaft to the empty-bobbin supports, devices operated by said connections for moving the coils of yarn from the spindles, and means operated by said oscillating shaft for moving the flyer arms from the path of devices for moving coils of yarn from the spindles.

6. In doffing mechanism for spinning, doubling and like machines, a shaft, means for oscillating same by power, means for oscillating same by hand, a device for connecting or disconnecting these two means, a cam mounted on said shaft, a plate, fingers carried by said plate for moving the flyer arms connections from said cam to said plate, chain wheels fixed on said shaft, a lifter plate, chains extending from said wheels to the bearings of said lifter plate, guides for said bearings, an additional chain wheel mounted on said oscillatory shaft, a counterbalancing weight carried by a chain fastened to said wheel, projections on said chain, a lever operated by said projections, a plate having bobbin supporting devices operated by said lever, a plate carried by pivoted levers operated by said lever, and bifurcated parts or thread movers carried by said plate.

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