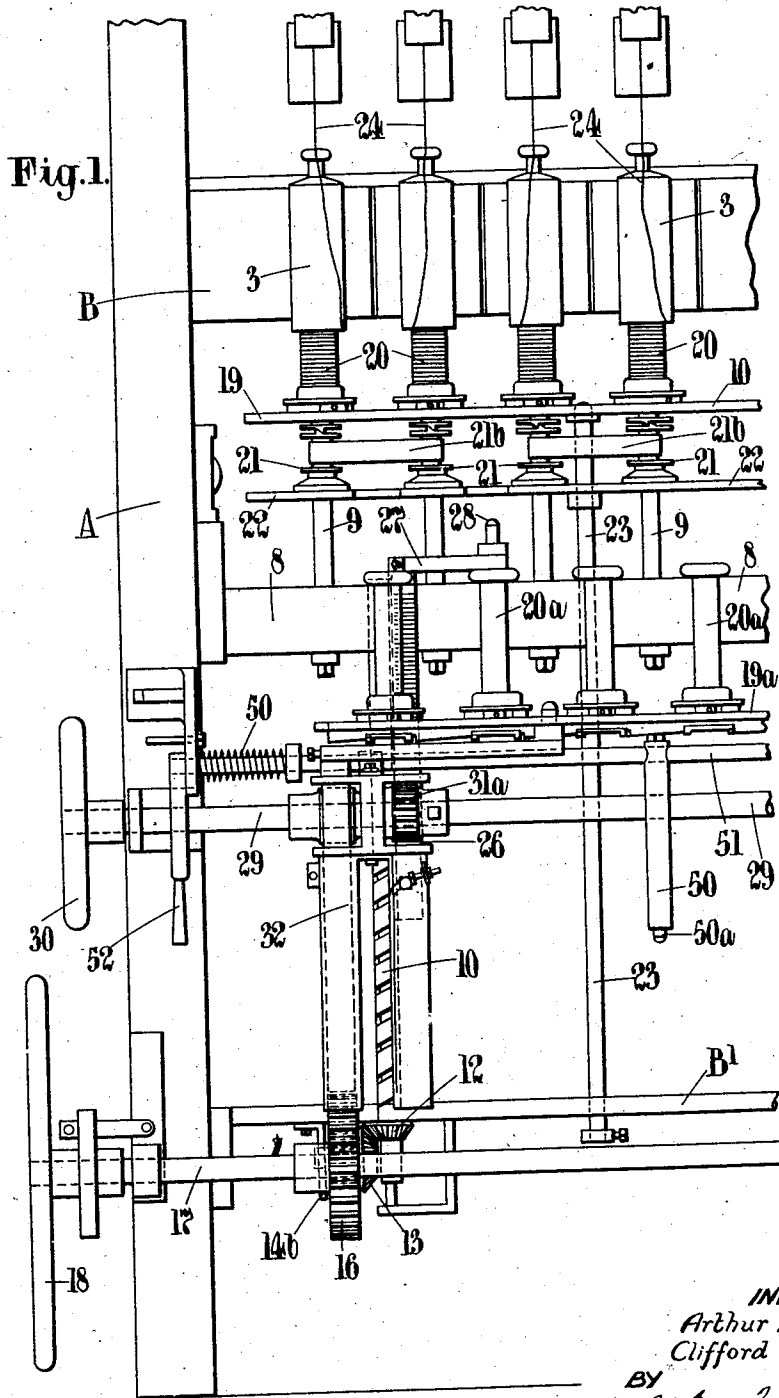


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A. RHODES ET AL
DOFFING MECHANISM FOR SPINNING, DOUBLING,
TWISTING, AND LIKE MACHINES
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7 Sheets-Sheet 1



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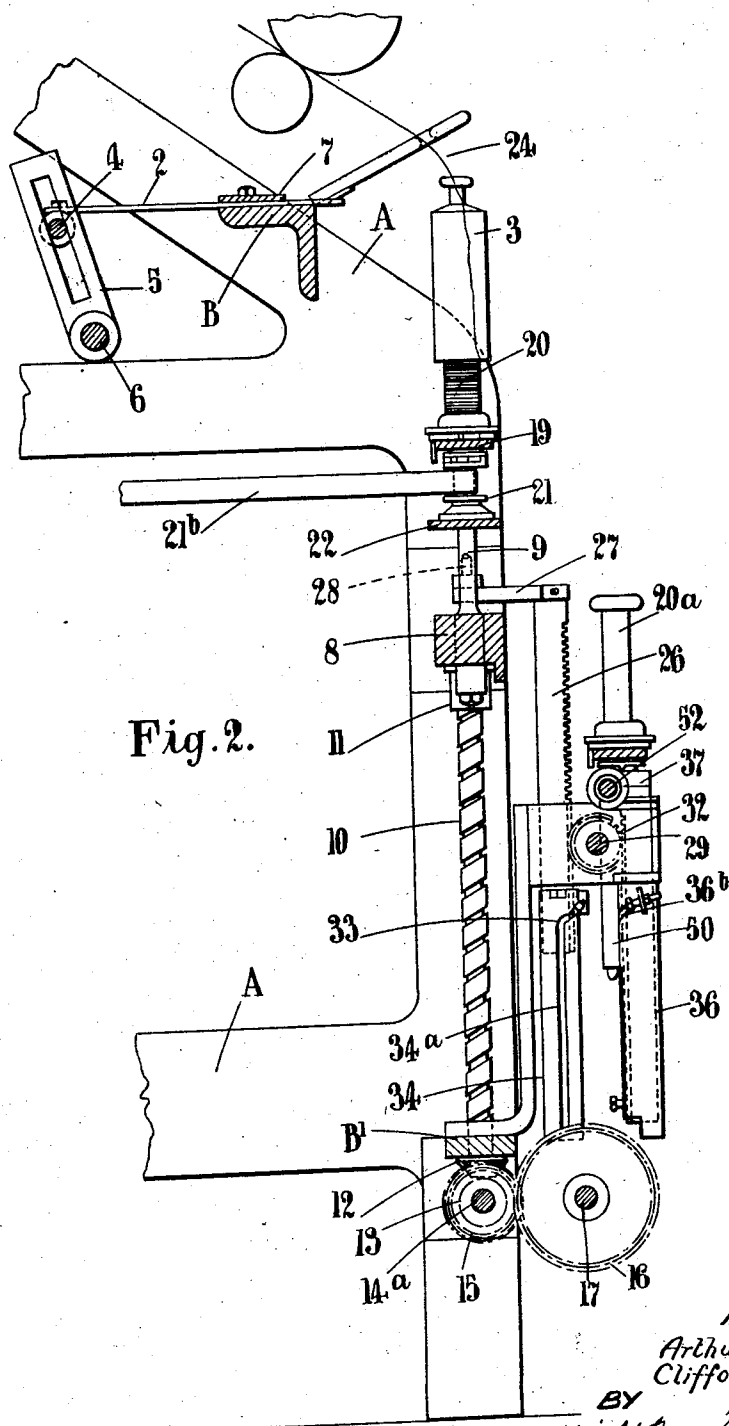


Fig. 2.

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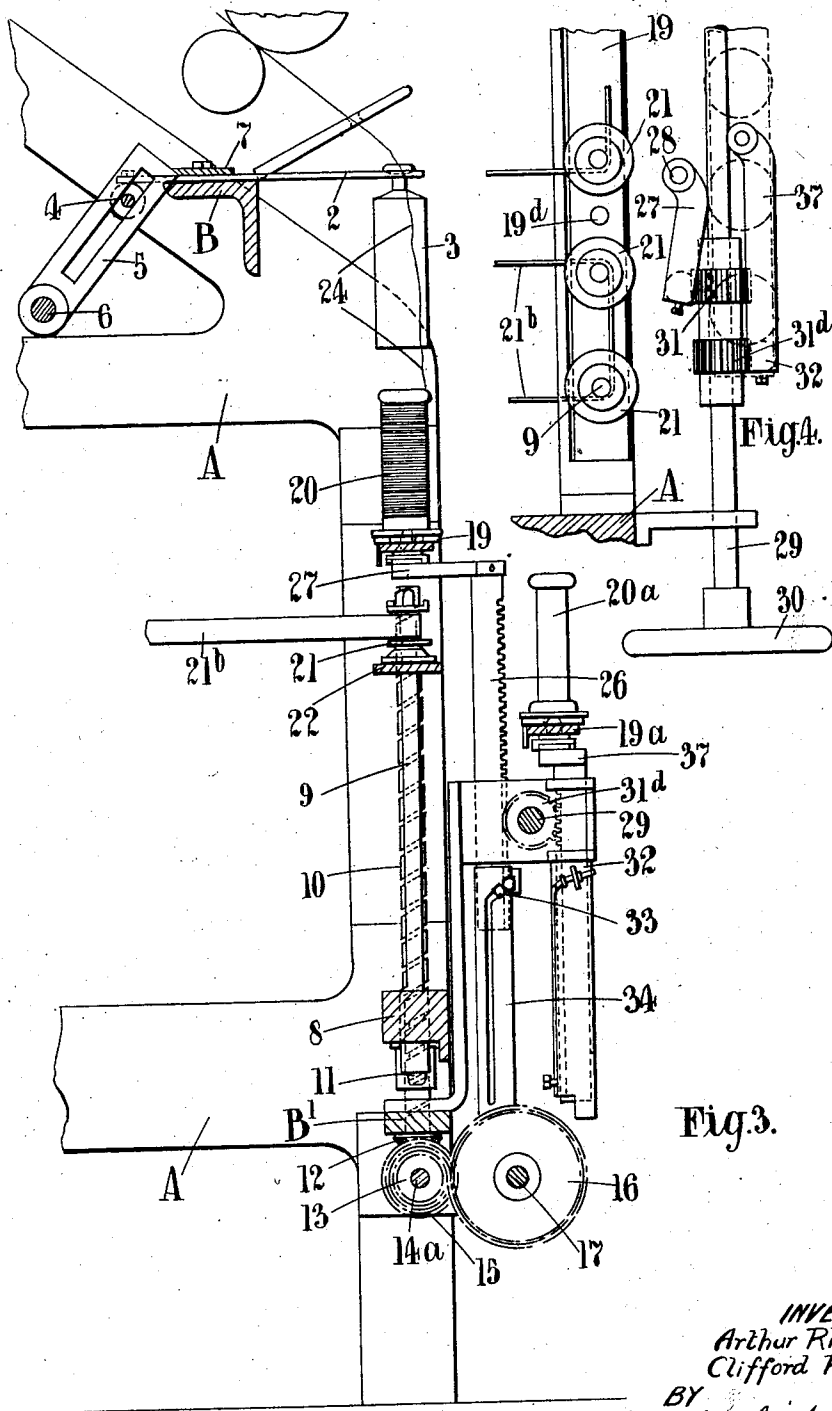


Fig. 3.

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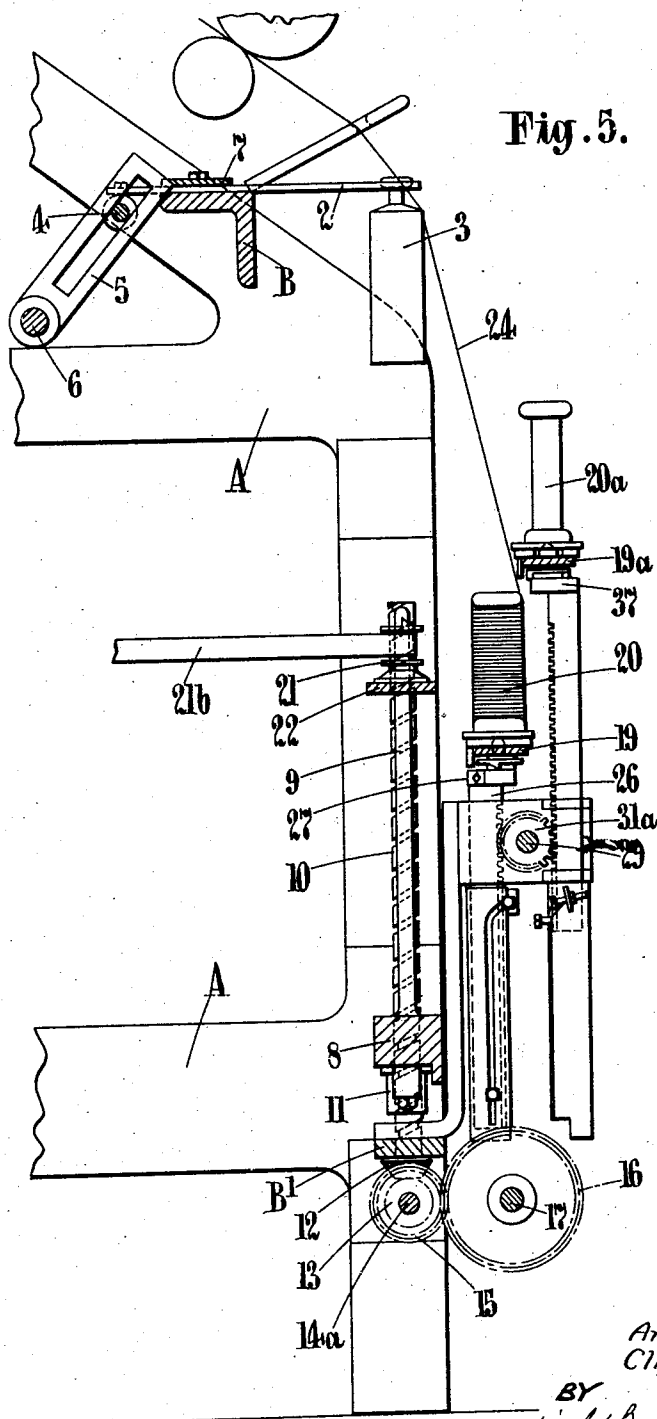
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Fig. 5.



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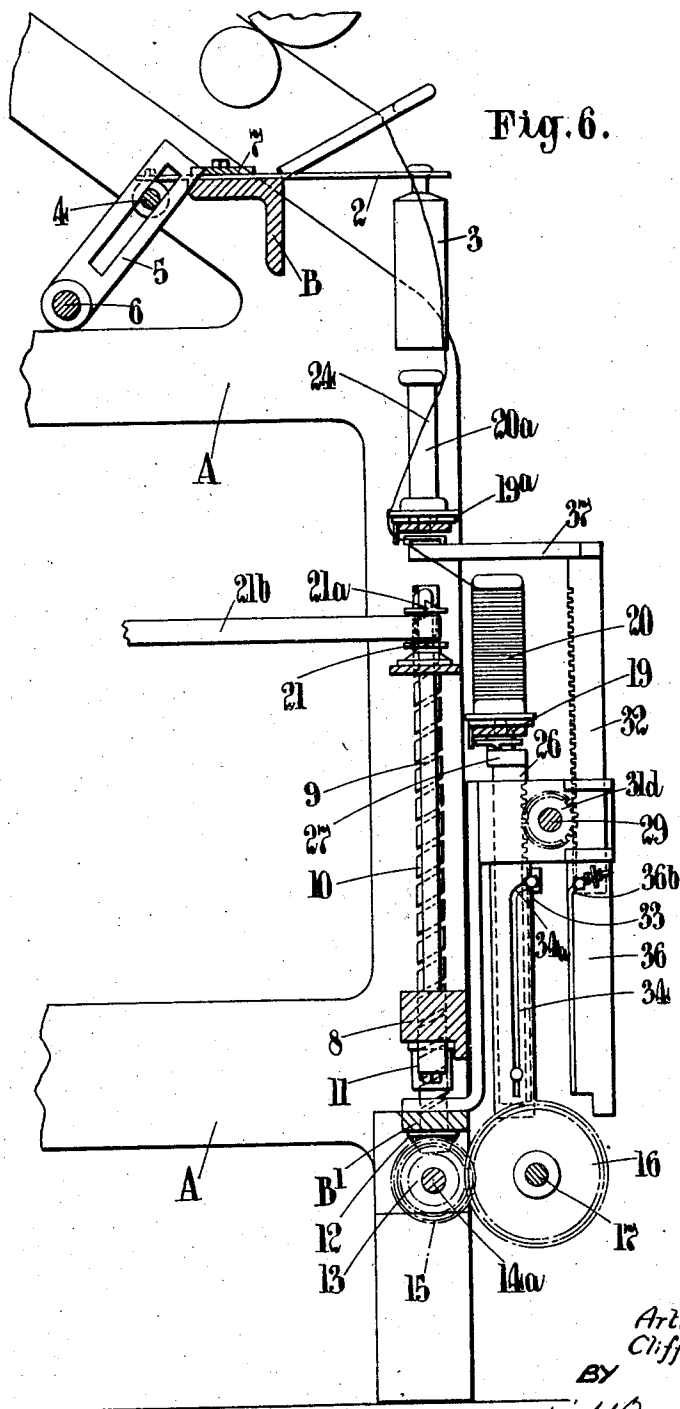


Fig. 6.

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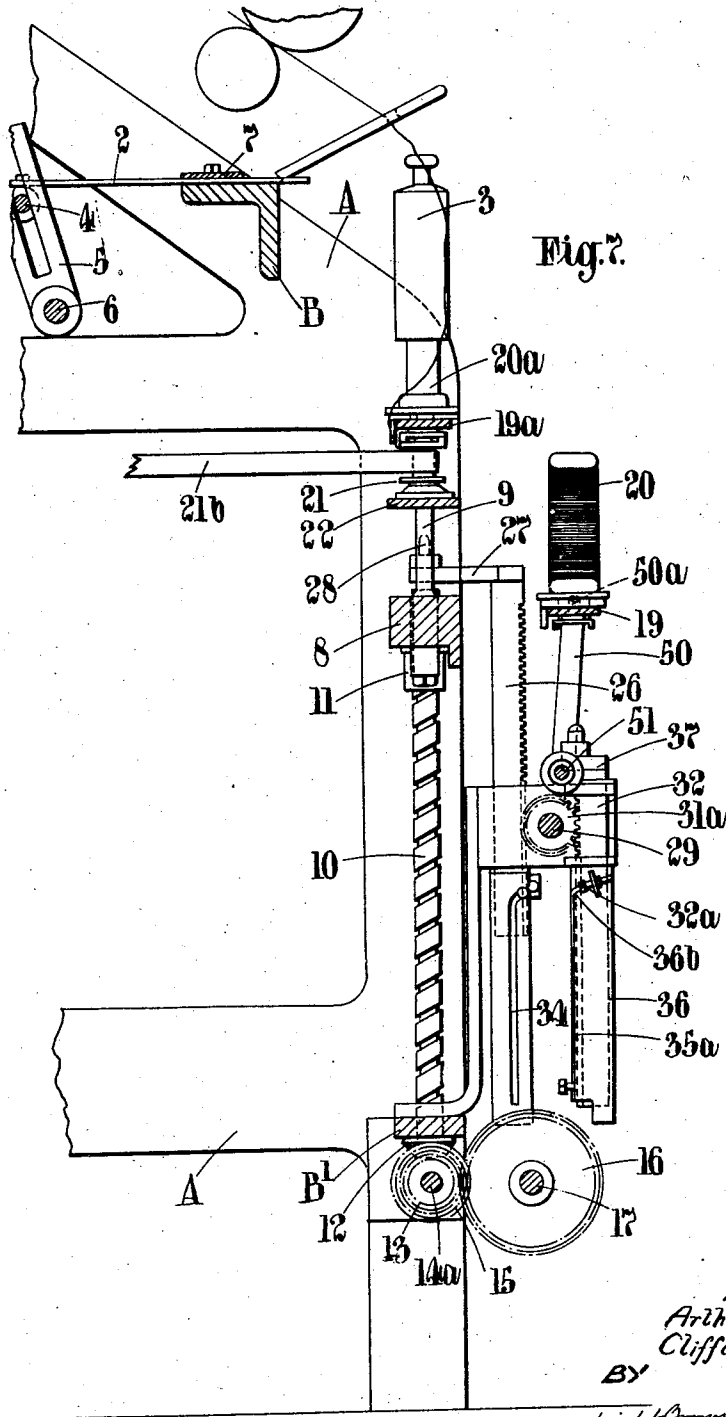
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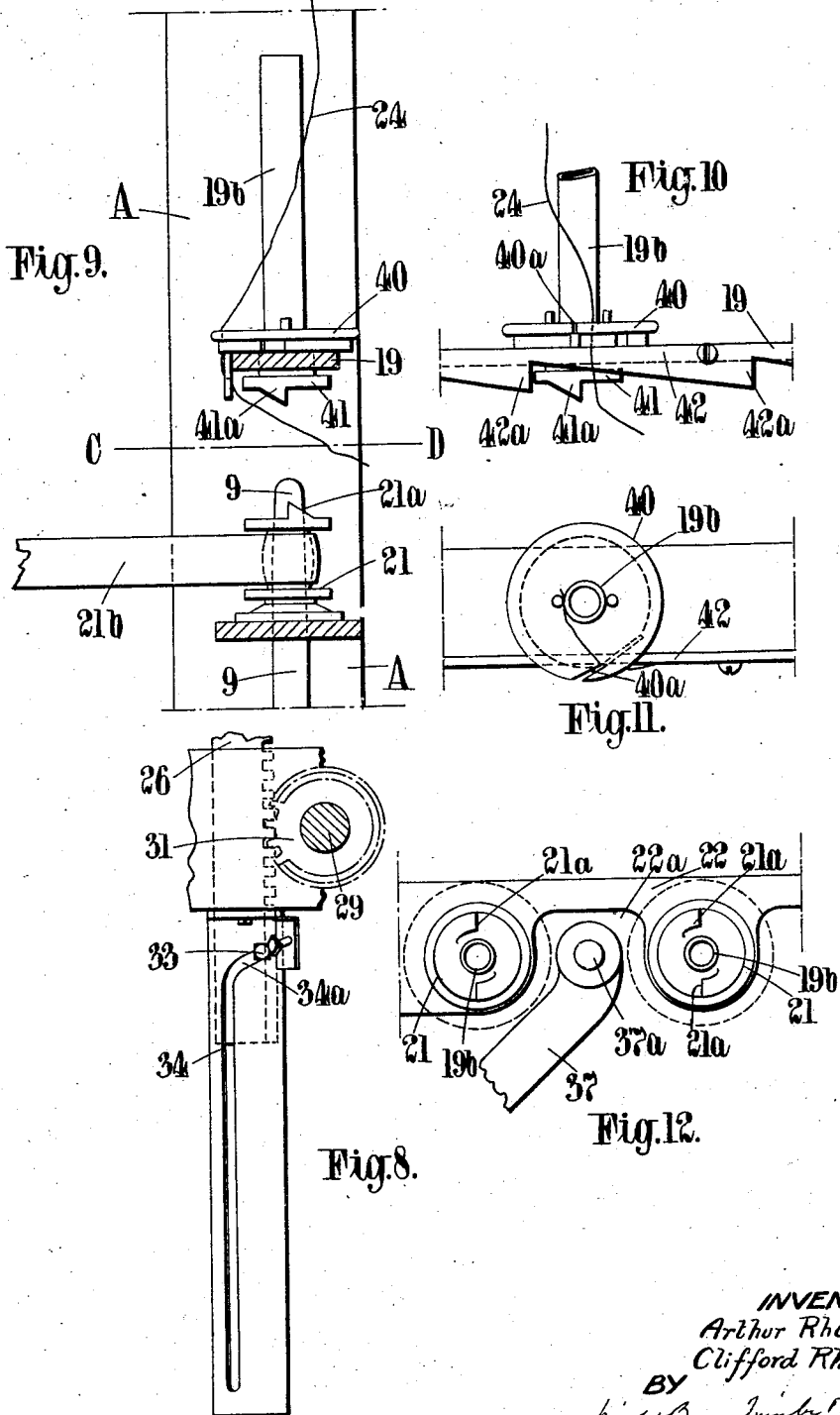
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7 Sheets-Sheet 7

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UNITED STATES PATENT OFFICE.

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DOFFING MECHANISM FOR SPINNING, DOUBLING, TWISTING, AND LIKE MACHINES.

Application filed December 28, 1926, Serial No. 157,455, and in Great Britain November 28, 1925.

It relates to doffing mechanism for spinning, doubling, twisting and like machines used in the production of yarns or threads of fibrous substances, and consists in the employment of means whereby the process of doffing is greatly simplified and the parts or devices employed for carrying out said doffing process are greatly reduced in number as compared with those heretofore made use of, while certain parts of the apparatus we employ may be applied to flyer spinning frames as well as those known as cap spinning frames.

In order that our said invention may be readily understood, we have hereunto appended sheets of drawings illustrative thereof, to which by figures and letters, reference is made in the following description:—

Fig. 1 is a front elevation of sufficient of a cap spinning frame to show the application thereto of our improved parts, all of said parts being shown as adjusted in their respective positions during the effective operations of the machine.

Fig. 2 is a sectional end elevation showing our improved parts mounted in position as when the spinning machine is in use or running.

Fig. 3 is a similar view to Fig. 2 but shows the cap laid-hold of in its highest position and suspended while the spindle is withdrawn therefrom and brought into its lowest position, certain of our improved devices being shown as supporting the full bobbins.

Fig. 4 is a sectional plan of certain of the parts shown by Figs. 1 and 2 but adjusted in their respective positions hereinafter described.

Fig. 5 is a similar view to Figs. 2 and 3 but illustrates the several parts adjusted in certain relative positions hereinafter explained.

Fig. 6 is also a similar view to Figs. 2 and 3 but shows the empty bobbins being placed in position ready for the spindles and caps to engage therewith prior to the spinning operations being commenced.

Fig. 7 is a similar view to Fig. 6 but shows the parts readjusted in position ready for the spinning operations to commence and with the full bobbin removed from the spinning frame ready to be taken away in known manner.

Fig. 8 is an elevation showing certain of

the operating mechanism in detail in order to more clearly illustrate the construction of same.

Fig. 9 is an elevation showing the driving wharfe and the tube to which it transmits motion in their respective positions herein-after described.

Fig. 10 is an elevation of the upper part shown by Fig. 9 as seen in the direction looking from left to right of said figure.

Fig. 11 is a plan of the parts shown by Fig. 9.

Fig. 12 is a plan of the parts below line C—D of Fig. 9.

Figs. 8 to 12 inclusive are drawn to an enlarged scale.

A indicates the end frame of the machine and B B¹ the upper and lower longitudinal rails forming the framework of the machine in known manner.

In carrying our invention into effect in connection with a cap spinning machine as is herein illustrated by the drawings, we make use of the usual sliding bifurcated members 2 which lay-hold-of the upper ends of the caps 3 to retain same when the spindles 9 are removed, but in accordance with our invention we pivot these bifurcated members 2 upon a rod 4 which extends from end to end of the machine in order to be supported by radial arms 5 which extend from another rod or shaft 6.

This rod or shaft 6 is arranged to be oscillated by hand lever or hand wheel devices in well known manner in order that by the oscillations of this rod 6 the bifurcated members 2 may be moved from their inoperative positions shown by Fig. 2 to their forward positions where they lay-hold-of the cap 3 as shown by Fig. 3.

As will be observed the bifurcated members 2 rest and slide over the upper surface of the longitudinal binding rail B over which they are guided by a covering rail 7 shown by the several drawings, by which arrangement the bifurcated members 2 may occupy comparatively little space and may be cheaply produced while we have found them to carry out their functions efficiently.

In conjunction with the devices described we make use of the usual spindle rail 8 which extends from end to end of the machine and has fixed upon it the series of spindles 9 which as is well known are held stationary

during the spinning process. The longitudinal spindle rail 8 is arranged to slide and to be guided by the framework of the machine in such a vertical path that it may be lowered from its operating position shown by Fig. 2 down to its lowest position as shown by Fig. 3 for the purpose hereinafter explained, and according to our invention we effect this rising and falling movement of the spindle rail 8 by the employment of vertical screws 10 which are supported at their lower ends by the rail B¹ while their upper ends are made to take through a screwed nut 11 fixed upon the rail 8.

The number of screws 19 is arranged to be in accordance with the length of the rail 8, the longer such rail 8 is so is the number of screws 10 increased. Upon the lower end of each screw 10 is fixed a bevel wheel 12 which gears or meshes with another bevel wheel 13 fixed to a pinion 15 which is mounted upon a stud 14^a fixed to a bracket 14. Each screw 10 has its bevel 12 meshing with the said corresponding wheel 13 mounted as described according to the length of the rail 8 and the number of screws required to operate same. Each pinion 15 is operated by its respective driving wheel 16 fixed upon a shaft 17 which extends lengthwise the machine. The shaft 17 is actuated by a hand wheel 18.

By the attendant operating this hand wheel 18 the shaft 17 is rotated and the several wheels 16 which engage with the pinions 15 are also rotated and as these pinions 15 are coupled to the bevel wheels 13 which mesh with the bevel wheels 12 rotary motion in one direction or the other direction, as may be desired, is given to the screws 10 thus as said screws 10 are rotated the rail 8 and its spindles 9 may be caused to descend from their highest to their lowest or from the lowest to their highest position as will be understood.

In combination with the apparatus described we now make use of a plate or rail 19 which extends lengthwise the machine so that the metal tubes 19^b (see Figs. 9, 10, 11 and 12) upon which the bobbins 20 are placed for spinning and winding in known manner, may be mounted to revolve upon said rail 19 thus these tubes 19^b and the bobbins 20 which they support, are separate from the driving wharles 21 which revolve freely upon the spindles 9 which take through said wharles or pulleys 21 as well as through the tubes 19^b and their bobbins 20, so that they may be raised and lowered by the ordinary lifter rail 22 as will be understood. In other words although the rails 22 and 19 support the wharles 21 and the tubes 19^b carrying the bobbins 20 separately, yet when the lifter rod 23 (which is the old and well known lifter or poker rod and

is operated in the old and well known manner) rises and descends it carries with it both of the rails 22 and 19 and the wharles 21 and the tubes 19^b with their bobbins 20 in their said vertical paths at which time the several parts carried by the said two rails 22 and 19 will slide over the spindles 9 also in well known manner.

The plate 19 and supports for the bobbins 20 are duplicated so that we have two of such plates 19 and their parts which support the bobbins 20 in order that when one is in use the other may be out of use as is hereinafter explained, while when the one which is in use has had the bobbins which it operates supplied with their full quantity of yarns or threads 24, the rail 19 may be removed and the other rail 19^a may be made to take its place in which case said rail 19^a will have its bobbins 20^a empty prior to being placed in position ready for the spinning operations to be recommenced as is shown by Fig. 6.

As means for laying hold of or receiving and supporting the tube carrying rail 19 when same has to be removed from the position it occupies upon the spindles 9 to the position shown at 19^a in front of the machine, we arrange vertical racks 26 which are sufficient in number to meet the requirements and which are situated in front of the machine so that a series of said racks 26 may carry at their upper ends radial arms 27 upon which projecting pins 28 are fixed in order that when said racks 26 are raised the radial arms 27 may be turned from the position shown by the plan Fig. 4 into the position shown by Figs. 2, 3 and 7 where the said pins 28 are in alignment with openings 19^d made in the plate 19 and which will pass through notches 22^a made in the lifter plate 22 in order that when the rail 8 is lowered by its screws 10, in manner hereinbefore described, the rail 22 will pass the outer end of the arms 27 and pins 28 and will allow the rail 19 to descend so that openings 19^d in said rail 19 will take over the pins 28 when in the position shown by Fig. 3.

At this time the rail 22 will descend along with the rail 8 into a lower position so that the upper ends of the spindles 9 are brought beneath the arms 27. thus by the attendant rotating the shaft 29 by means of the hand wheel 30 said hand wheel 30 will operate pinions 31 which mesh with the racks 26 while other pinions 31^a mesh (at the opposite side) with the racks 32 which are same in number as the racks 26 throughout the length of the machine, consequently when the racks 26 rise the racks 32 descend.

As the attendant revolves the shaft 29 by the hand wheel 30 the pinion 31 may be made to cause the racks 26 to descend and in descending (by reason of radial pin 33 which is fixed to the rack 26 being made to

extend through a cam slot 34^a made in a tube 34) a swivelling action is transmitted to the rack 26 to cause it to revolve and carry with it the arms 27 so as to remove the pins 28 from the position in alignment with the spindles 9 into the position shown by Figs. 4, 5 and 6. Here it will have brought its rail 19 clear of all the parts which are in alignment with the spindles 9 in order that said spindles may be freely raised as is hereinafter described.

By additional pinions 31^a (also fixed on the shaft 29) meshing with the additional racks 32, as the racks 26 are caused to descend by the actions of said shaft 29, the racks 32 will be caused to rise (by the actions of the pinions 31^a) and when the pins 32^a, which extend from said racks 32 through longitudinal slots 35^a made in the tubes 36, reach the cam slots 36^b then swivelling motion will be transmitted to the racks 32 so that they will bring their radial arms 37 from the position shown in Fig. 4 into the position shown by Fig. 6 where the empty bobbins 20^a which are carried by the rail 19^a are brought into alignment with the spindles 9 in which position the racks 26 and their arms 27 with their rail 19 will have descended into the position shown by Fig. 6 with the full bobbins carrying with them the extending threads 24. When the rail 19^a was being moved horizontally over the top of the full bobbins 20 shown by Fig. 6 the edge of the rail 19^a will have carried with it the threads 24 so that these threads 24 are in contact with the peripheral edges of the discs 40 fixed upon the lower ends of the tubes 19^b upon which the bobbins 20^a are mounted. By the discs 40 thus coming into contact with the threads 24, when the machine is started into action to rotate the tubes 19^b and their discs 40, notches 40^a made in these latter engage with the threads 24 and move and sever same as is herein-
after explained.

As is hereinbefore described when the racks 26 and 32 have been operated by pinions carried by the shaft 29 to place the empty bobbins 20^a in the position shown by Fig. 6 in order to carry out the readjustment of the parts ready for the spinning operations to recommence as is hereinafter explained, the racks 26 and 32 are again adjusted so that the arms 37 are brought back to their positions shown by Fig. 4 and the arms 27 are then raised to carry the plate 19 and its full bobbins high enough to permit the attendant to bring arms 50 having projecting pins 50^a beneath said plate 19. After these arms 50 have thus received the plate 19 the attendant may then move them to carry this latter and its full bobbins into the position shown by Fig. 7. The full bobbins are retained in this position until removed by the attendant and the arms 27

remain in the position also shown by Fig. 7 during the spinning operations as above stated.

The arms 50 are fixed upon a shaft 51 which extends lengthwise the machine to carry the whole series of said arms 50; and this shaft 51 is actuated by a handle 52 shown by Fig. 1.

As is hereinbefore stated the tubes 19^b are separate and detachable from engagement with the wharles or driving pulleys 21 and to enable the one to engage with the other a disc 41 fixed to the lower end of tube 19^b has an engaging tooth or teeth 41^a which will engage with a corresponding tooth 21^a on the wharle 21 in order that the motions of the driving tape 21^b which effect the rotary motions of the wharle 21 may also through the coupling teeth 41, 41^a transmit motion to the tubes 19^b and the bobbins which they carry.

To the rear of the plate or rail 19 is fixed a notched cutter bar 43 the notches 42^a in which are in such positions that by the disc 40 carrying the thread 24 during its rotary motions, said thread will be wound around the bobbin tube 19^b for about one revolution and then will be severed by being brought in contact with the sharpened edge 42^a of the cutter bar 42, with the result hereinafter described.

The actions of the parts hereinafter described are as follows:—

On the spinning operations being completed with the full bobbins 20 ready to be removed from the spinning spindles in order to enable the empty bobbins 20^a to take their places the motions of the machine are arrested. The attendant then actuates the bifurcated pieces 2 and moves them forward in manner described to engage with the caps 3 as shown by Figs. 3, 5 and 6, so that the said caps 3 will be supported by said bifurcations in manner well known. He will then operate the well known devices for lowering the poker rods 23 in order that the lifter rail 22 and the additional rail 19 may be lowered into their lowest positions shown by Figs. 3, 5 and 6.

During said operations the arms 27 carried by the racks 26 will be in their normal position shown by Fig. 3 (which position they are allowed to assume during all the spinning operations) so that they will there receive the plate 19 and the parts including the full bobbins which it carries. The attendant will then actuate the hand wheel 18 and cause (through the spur wheels and devices which are moved by it) the screws 10 to rotate in order that these latter will lower the rail 8 from the position shown by Figs. 1 and 2 to the position shown by Figs. 3, 5 and 6.

On descending into this position the rail 22 and the wharles it supports, descend into

their position as shown by Figs. 3, 5 and 6. During the descending of the plates 22 and 19 as above described (by reason of the plate 22 moving past the horizontal arms 27) the plate 19 will also descend so that the openings therein will take over the pins 28 on the arms 27. The attendant may then again actuate the hand wheel 30 in order to cause the racks 26 to descend at which time the actions of the cam slots 33 upon the racks 26 will cause same to rotate and carry the rail 19 entirely clear and out of alignment with the spindles 9 so that the said rail 19 may descend into the position shown by Fig. 5, carrying with it the full bobbins 20.

As the full bobbins 20 are thus lowered and before reaching their very lowest positions the racks 32 will have raised the plate 19^a so that it reaches its highest position and on approaching its highest position the actions of the cam slots 33^b as above described, cause the arms 37 to swivel horizontally to bring their rail 19^a into the position previously occupied by the rail 19 and as is shown by Fig. 6. This rail 19^a will have thus brought the empty bobbins 20^a into the said position in order that the attendant may then actuate the hand wheel 13 and cause the rail 8 to rise to its normal position in which position it is adjusted and in which position the ordinary poker rods 23 will have also been adjusted so that the empty bobbins 20^a are made to take within the caps 3 while the spindles 9 also will be raised to take into the upper ends of said caps 3 thus the bifurcated members 2 may be withdrawn from supporting said caps 3.

When these parts are thus readjusted in position the attendant may then start the machine into its spinning operations and the actions of the disc 40 upon the threads 24 will have the effect of winding said threads for one revolution around the empty bobbins 20^a and severing same so that the spinning operations may continue.

We have hereinbefore described our invention as applied to cap spinning, doubling, twisting and like machines, and from said description it will be readily understood that in those types of flyer spinning, doubling, twisting and like machines having doffing mechanism wherein the spindle rail and spindles have to be removed in the manner described in connection with the removal of the rails 19 and 19^a herein referred to our said devices may be made use of to perform their usual functions on these machines.

Such being the nature and object of our said invention what we claim is:—

1. In doffing mechanism for spinning, doubling and like machines, a spindle, a rail upon which said spindle is fixed a screw for raising and lowering said rail and spindle, means for actuating said screw, a driving pulley or wharfe mounted to revolve on said

spindle, means for transmitting motion to said wharfe, a tube for supporting a bobbin mounted upon said spindle and arranged to engage with said wharfe, said bobbin, a rail for supporting the tube and the bobbin above the wharfe, devices for removing and retaining said rail and its tube, a lifter rail for supporting the wharfe and the tube with which it engages, means for actuating said lifter rail, a cap mounted upon the upper end of the spindle, devices for engaging said cap and supporting same when the spindle is withdrawn, a second rail for supporting another tube, devices for carrying said second rail and placing same into alignment with the spindle above the wharfe and means for engaging the thread in order to sever same and cause it to encircle the bobbin.

2. In doffing mechanism for spinning, doubling and like machines, a spindle, a rail upon which said spindle is fixed, a screw for raising and lowering said rail and spindle, means for actuating said screw, a driving pulley or wharfe mounted to revolve on said spindle, means for transmitting motion to said wharfe, a tube for supporting a bobbin mounted upon said spindle and arranged to engage with said wharfe, said bobbin, a rail for supporting the tube and the bobbin above the wharfe, devices for removing and retaining said rail and its tube, a lifter rail for supporting the wharfe and the tube with which it engages, means for actuating said lifter rail, a cap mounted upon the upper end of the spindle, devices for engaging said cap and supporting same when the spindle is withdrawn, a second rail for supporting another tube, devices for carrying said second rail and placing same into alignment with the spindle above the wharfe, another rail and its tube and bobbin interchangeable with the former rail carrying the other bobbin, devices for operating said two rails and their tubes and bobbins one set of said devices being to engage one rail and remove it while the other devices engage the other rail to displace the former rail, racks for raising and lowering said devices, slotted guiding members through which the racks rise and descend, cam grooves formed in said slots to move the racks and the levers they carry in the horizontal plane and means for actuating said racks.

3. In doffing mechanism for spinning, doubling and like machines, a spindle, a rail upon which said spindle is fixed a screw for raising and lowering said rail and spindle, means for actuating said screw, a driving pulley or wharfe mounted to revolve on said spindle, means for transmitting motion to said wharfe, a tube for supporting a bobbin mounted upon said spindle and arranged to engage with said wharfe, said bobbin, a rail for supporting the tube and the bobbin above the wharfe, devices for re-

moving and retaining said rail and its tube, a lifter rail for supporting the wharle, and the tube with which it engages, means for actuating said lifter rail, a cap mounted upon the upper end of the spindle, devices for engaging said cap and supporting same when the spindle is withdrawn, a second rail for supporting another tube, devices for carrying said second rail and placing same into alignment with the spindle above the wharle, another rail and its tube and bobbin interchangeable with the former rail carrying the other bobbin, devices for operating said two rails and their tubes and bobbins, one set of said devices being to engage one rail and remove it while the other devices engage the other rail to displace the former rail, racks for raising and lowering said devices, slotted guiding members through which the racks rise and descend, cam grooves formed in said slots to swivel the racks and the levers they carry in the horizontal plane, means for actuating said racks, a shaft mounted between the racks which operate the interchangeable rail, projections from said shaft for engaging with said two interchangeable rails, handle devices for actuating said shaft.

4. In doffing mechanism for spinning, doubling and like machines, a spindle, a rail upon which said spindle is fixed, means for raising and lowering said rail, a cap formed to be mounted on said spindle, means for removing said cap, a wharle mounted to revolve on said spindle, driving devices for said wharle, a lifter rail for moving the wharle over its spindle, another rail arranged to take over the spindle to carry a bobbin-tube, said tube, means for connecting said tube to the wharle, a swivelling arm for engaging said tube-carrying-rail, means for operating said swivelling arm, another swivelling arm for carrying another or duplicate tube-carrying-rail, said duplicate rail, a tube supported by said rail, means for operating said duplicate rail and devices whereby the tube-carrying-rails may be transferred from one swivelling arm to the other swivelling arm.

5. In doffing mechanism for spinning, doubling and like machines, a spindle, a rail upon which said spindle is fixed, means for raising and lowering said rail, a cap formed to be mounted on said spindle, means for removing said cap, a wharle mounted to revolve on said spindle, driving devices for said wharle, a lifter rail for moving the wharle over its spindle, another rail arranged to take over the spindle to carry a bobbin-tube, said tube, means for connecting said tube to the wharle, a cutter bar fixed

to said tube-carrying-rail, a swivelling arm for engaging said tube-carrying-rail, means for operating said swivelling arm, another swivelling arm for carrying another or duplicate tube-carrying-rail, said duplicate rail, a cutter fixed to said duplicate tube-carrying-rail, means for operating said duplicate rail and devices whereby the tube-carrying-rails may be transferred from one swivelling arm to the other swivelling arm.

6. In doffing mechanism for spinning, doubling and like machines, a spindle, a rail upon which said spindle is fixed, means for raising and lowering said rail, a cap formed to be mounted on said spindle, means for removing said cap, a wharle mounted to revolve on said spindle, driving devices for said wharle, a lifter rail for moving the wharle over the spindle, another rail arranged to take over the spindle to carry a bobbin-tube, said tube, a flange on said tube having a thread-engaging slot, means for connecting said tube to the wharle, a cutter-bar fixed to said tube-carrying-rail, a swivelling arm for engaging said tube-carrying-rail, means for operating said swivelling arm, another swivelling arm for carrying another or duplicate tube-carrying-rail, said duplicate rail, a cutter fixed to said duplicate tube-carrying-rail, means for operating said duplicate rail, and devices whereby the tube-carrying-rails may be transferred from one swivelling arm to the other swivelling arm.

7. In doffing mechanism for spinning, doubling and like machines, a spindle, a rail upon which said spindle is fixed, means for raising and lowering said rail, a cap formed to be mounted on said spindle, means for removing said cap, a wharle mounted to revolve on said spindle, driving devices for said wharle, a lifter rail for moving the wharle over its spindle, another rail arranged to take over the spindle to carry a bobbin-tube, said tube, means for connecting said tube to the wharle, a swivelling arm for engaging the tube-carrying-rail, a rack to which the swivelling arm is fixed, a guide for said rack, a projection from said rack taking into a cam-slot in the guide, another swivelling arm for carrying another or duplicate tube-carrying-rail, said duplicate-rail, a rack to which the swivelling arm is fixed, a guide for said rack, a projection from said rack taking into a cam-slot in the guide, devices for operating said racks and means whereby the tube-carrying rails may be transferred from one swivelling arm to another swivelling arm.

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