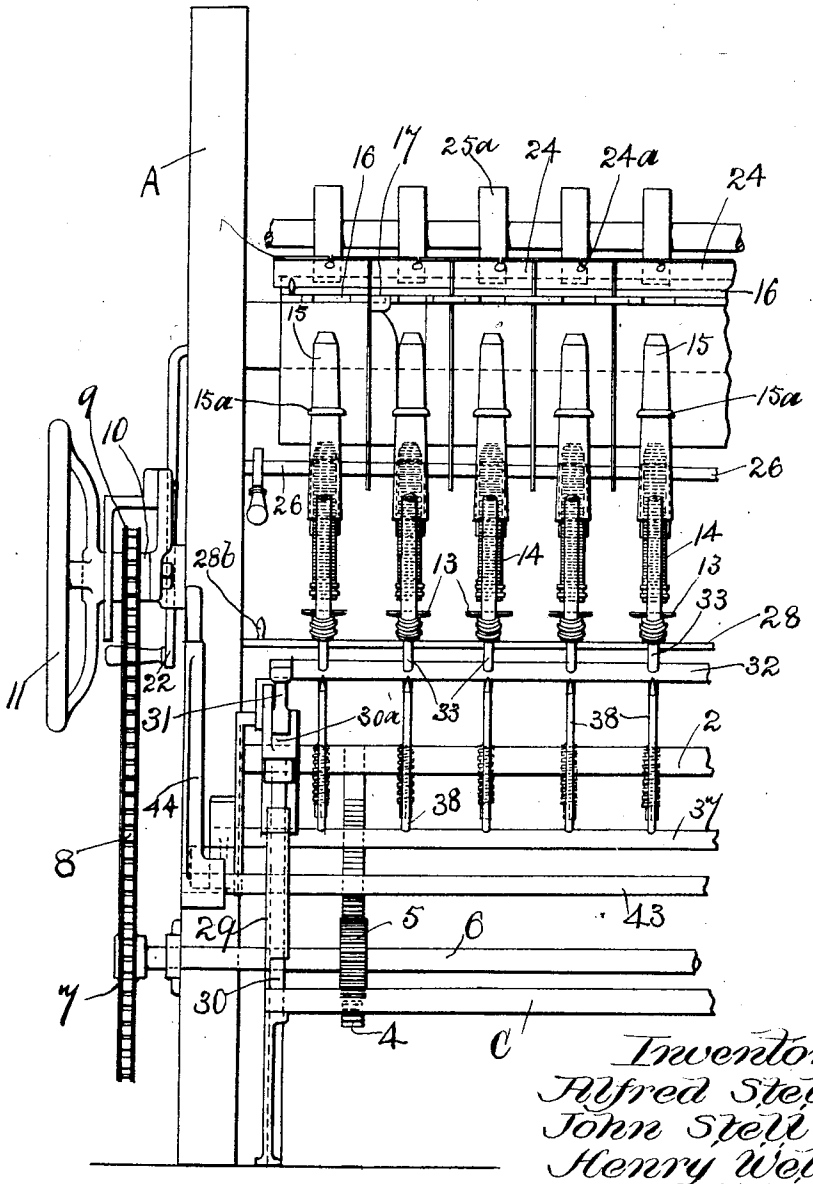
April 10, 1928. 1,665,720

A. STELL ET AL

DOFFING MECHANISM FOR CAP SPINNING, DOUBLING, AND LIKE MACHINES

Filed June 17, 1927 7 Sheets-Sheet 1

Fig. 1



Inventors
Alfred Stell
John Stell
Henry Welch
Wright Brown Quinby & May Attys.

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DOFFING MECHANISM FOR CAP SPINNING, DOUBLING, AND LIKE MACHINES

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Fig. 2

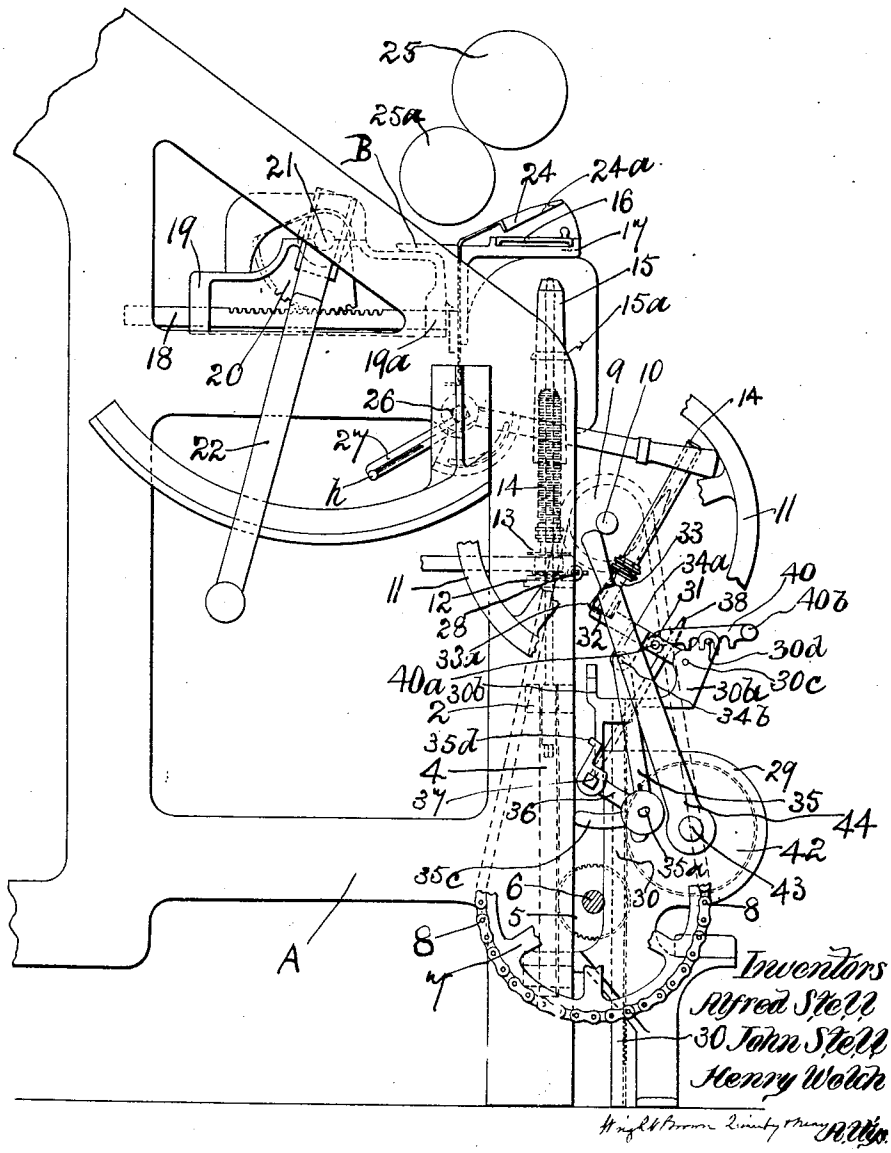

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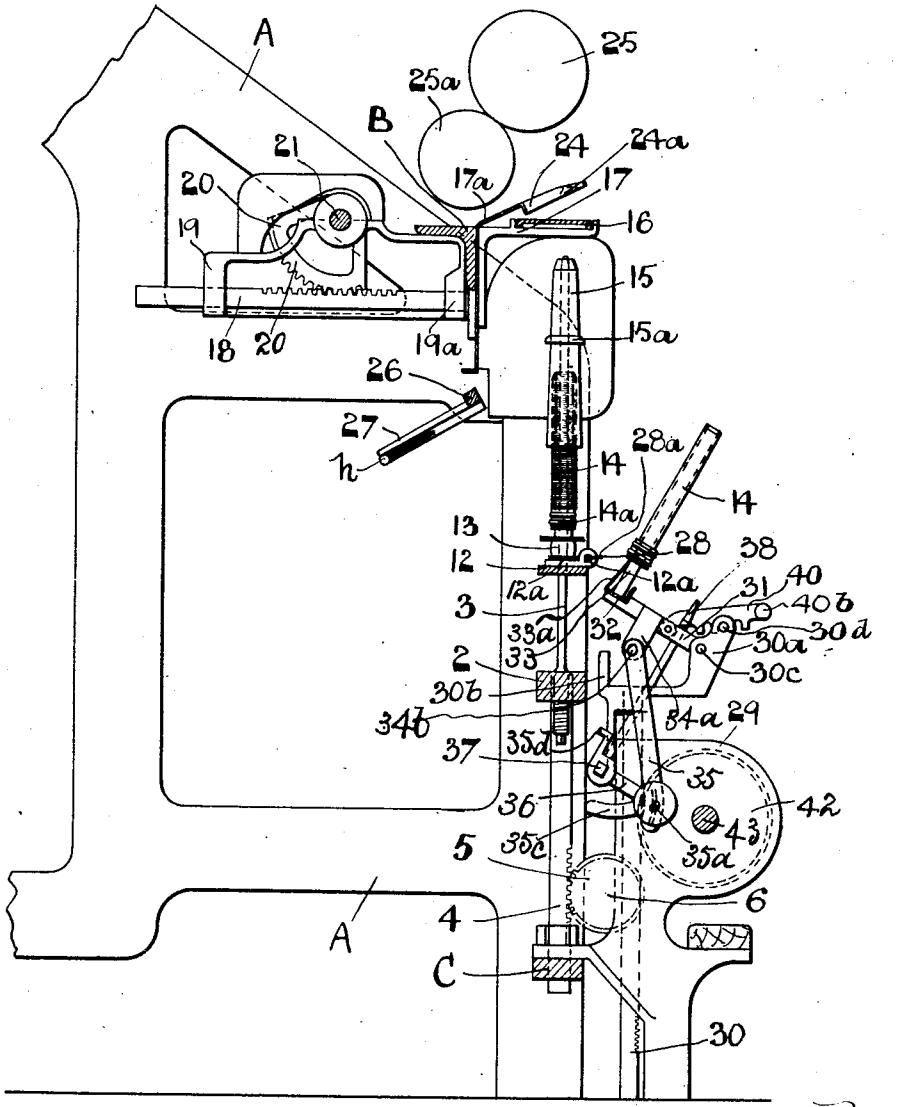
Fig. 3



Inventors
Alfred Stell
John Stell
Henry Welch
Wright Brown Quinby & May
Attys

April 10, 1928. 1,665,720

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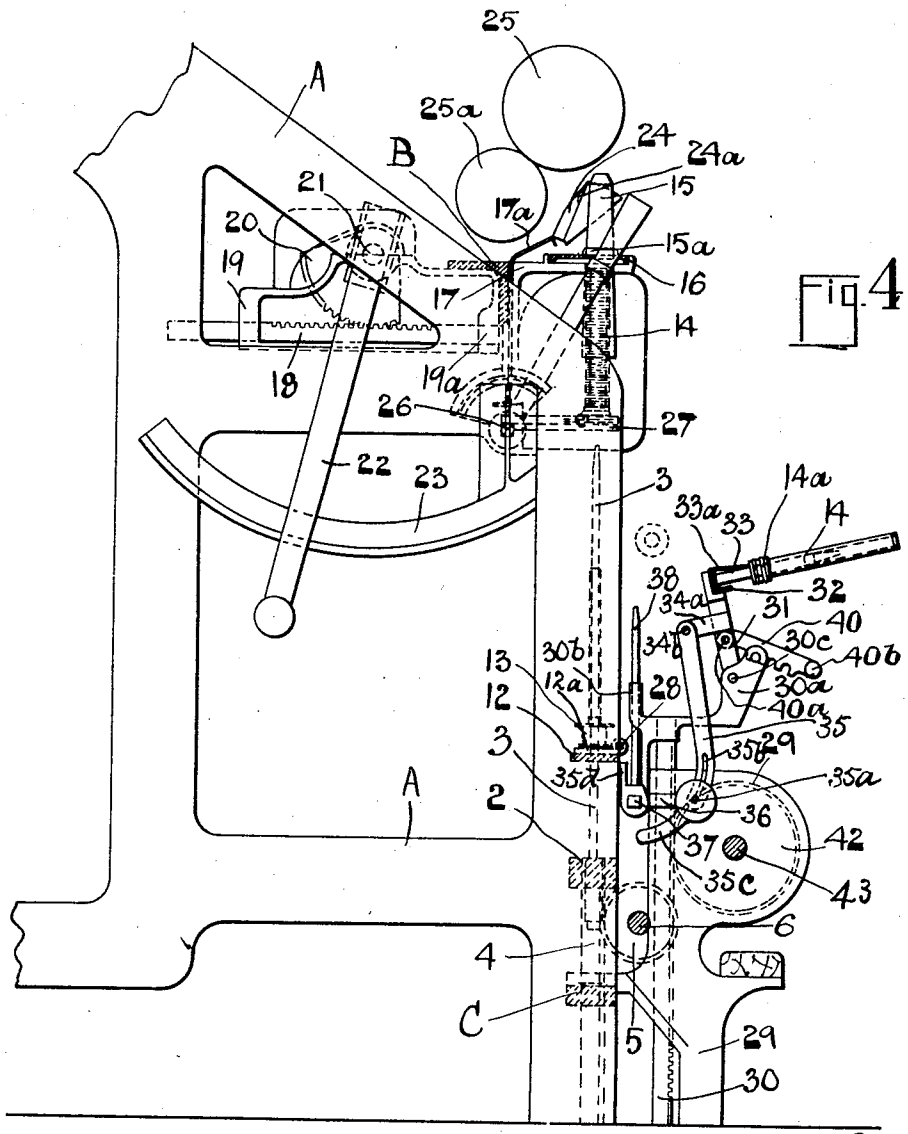

Fig. 4

Inventors
Alfred Stell
John Stell
Henry Welch

Wright Brown Quinby & May
Attys.

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A. STELL ET AL

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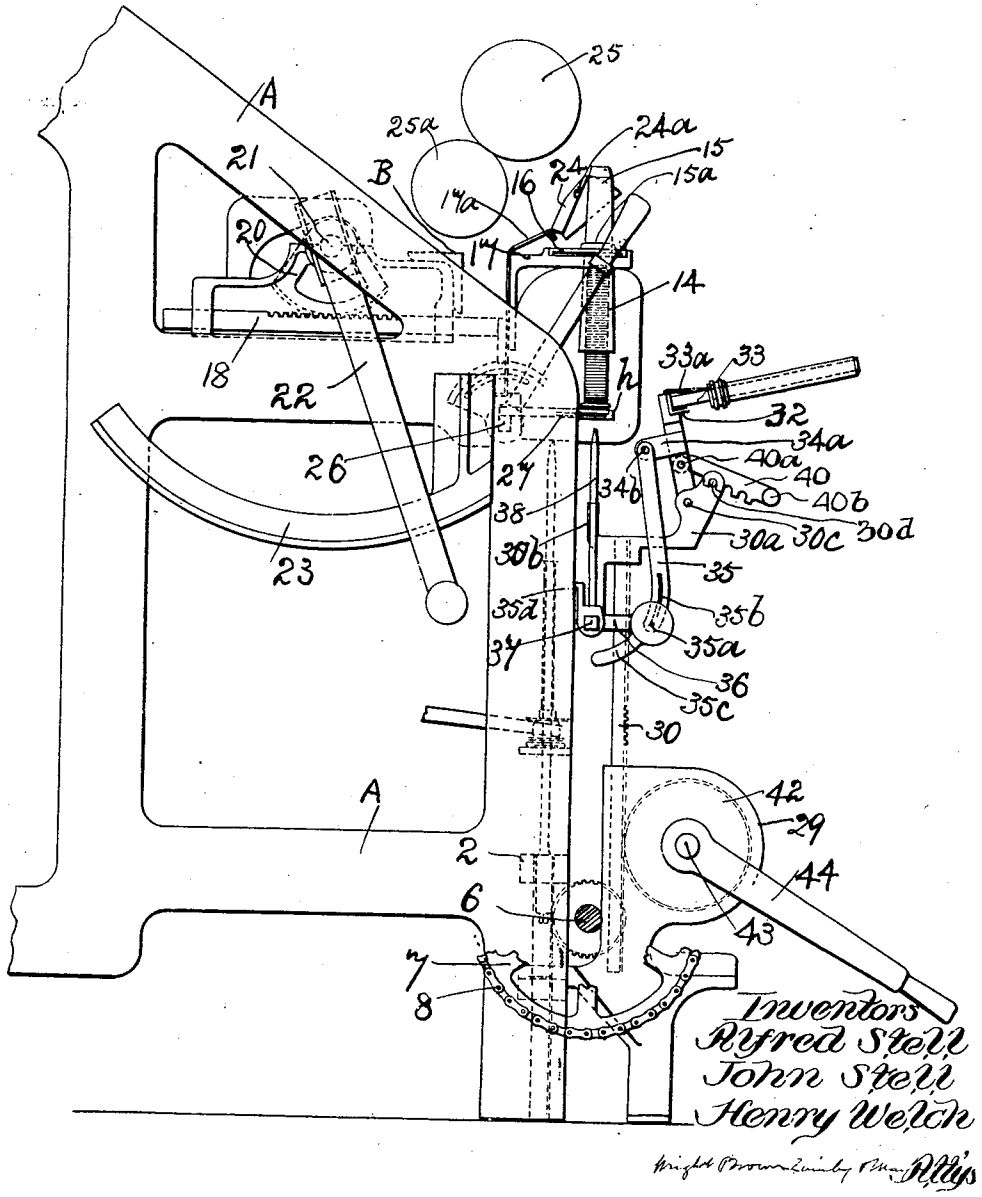
Fig. 5



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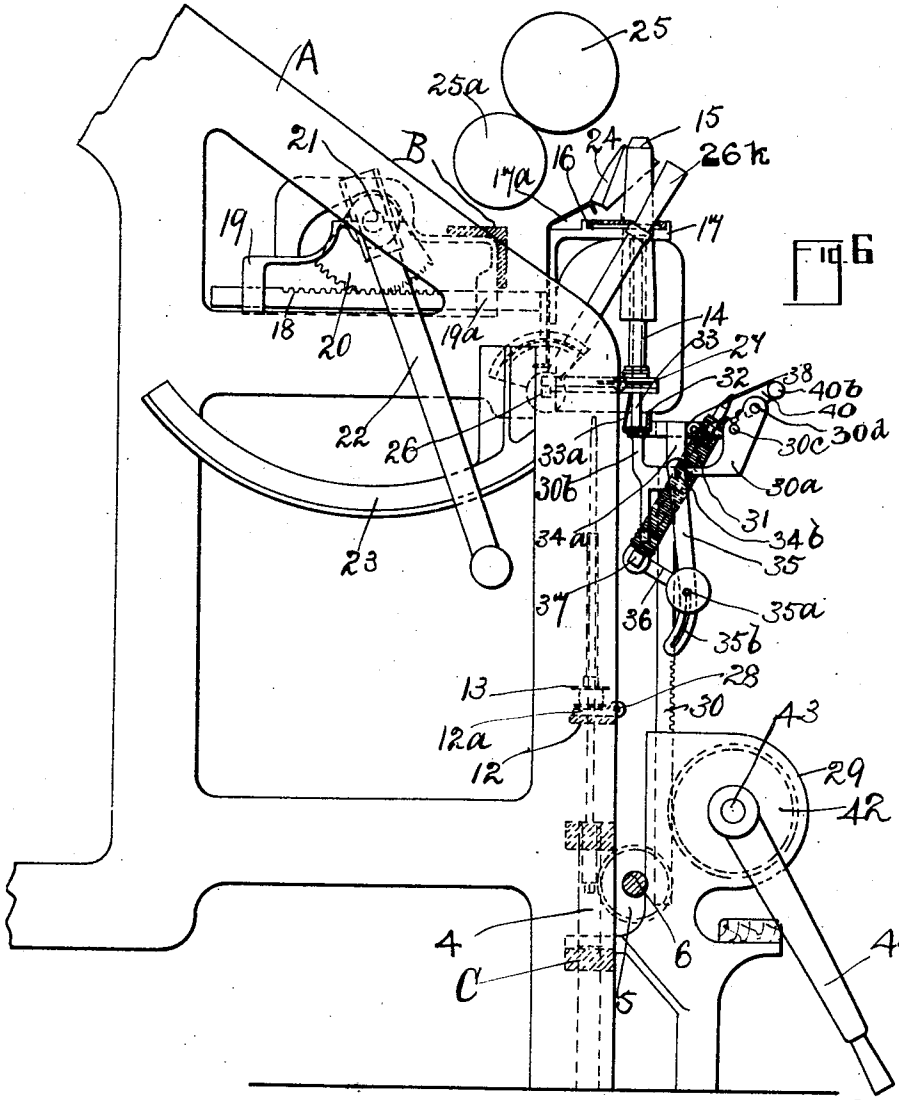

FIG. 6

Inventors
Alfred Stell
John Stell
Henry Welch
Wright, Brown, Quinby & May
Attys.

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A. STELL ET AL

DOFFING MECHANISM FOR CAP SPINNING, DOUBLING, AND LIKE MACHINES

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Fig. 7

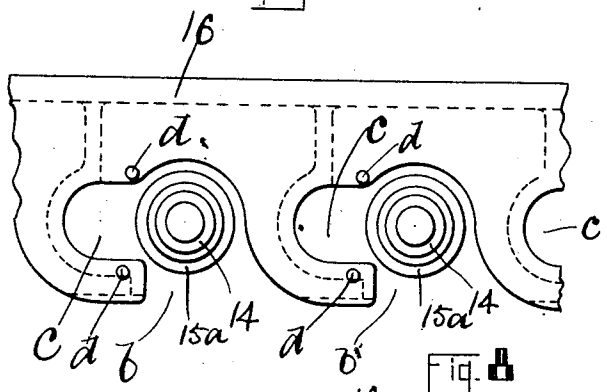


Fig. 9

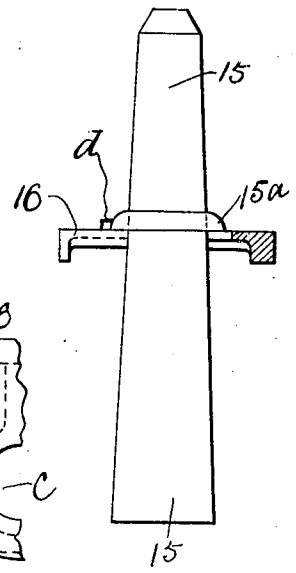


Fig. 8

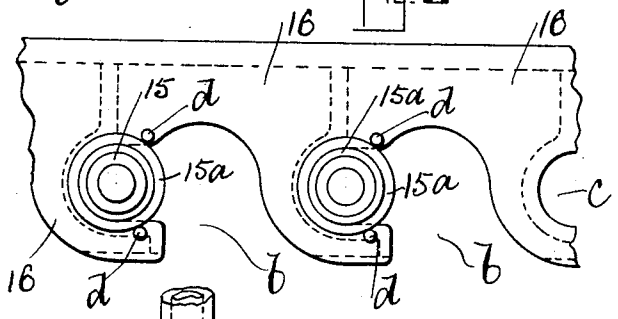


Fig. 11

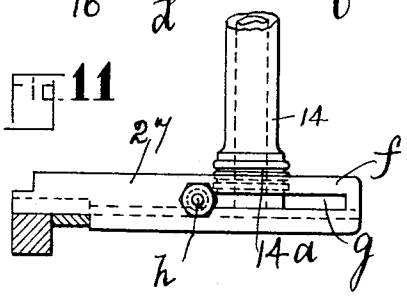


Fig. 10

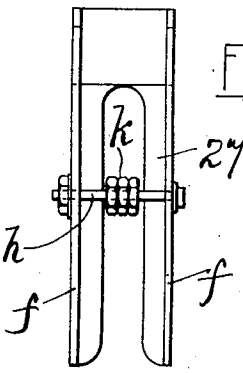


Fig. 12

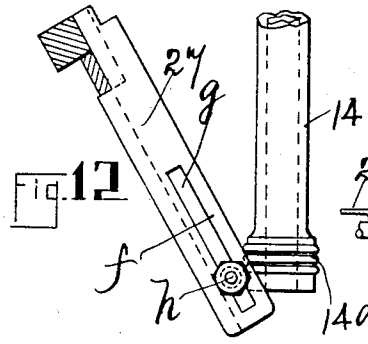


Fig. 13

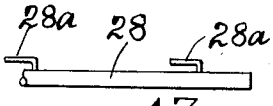
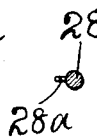


Fig. 14



Inventors
Alfred Stell
John Stell
Henry Welch
Wright Brown Quinby & May
Attys.

Patented Apr. 10, 1928. 1,665,720

UNITED STATES PATENT OFFICE.

ALFRED STELL, OF INGROW, KEIGHLEY, JOHN STELL, OF BROWFIELD, KEIGHLEY, AND HENRY WELCH, OF KEIGHLEY, ENGLAND.

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

Application filed June 17, 1927, Serial No. 199,604, and in Great Britain May 17, 1926.

This invention relates to spinning, doubling, twisting and like machines of the type well known as "cap spinning and like frames" which have doffing mechanism for removing the bobbins upon which the threads of yarn have been wound and which are usually styled the "full bobbins" and placing empty bobbins upon the spindles ready for the spinning and like operations to be recommenced.

In connection with doffing mechanism of this type of spinning and like machines especially where the bobbins are of considerable length difficulty is experienced in removing the caps which are also of an elongated character from off the spindles to prepare same for the removal therefrom of the full bobbins and the replacing thereon of the empty bobbins and our present invention consists in so constructing and arranging the caps and the mechanism for operating said caps that we are enabled within the ordinary vertical space, in which the usual spindles and their caps are mounted, to carry out the removal of the elongated caps and the replacing of the comparatively long bobbins upon the spindles after the removal of the full bobbins by our said improved formation and construction of devices. We are also enabled by our said improved apparatus to so carry out the necessary movements by devices which will occupy little space in front of the ordinary mechanism of the machine, while the removal of the full bobbins and the supplying of the empty bobbins, the restarting of the machine and cutting of the series of threads on the commencement of the winding and spinning operations are effected with greater precision than heretofore.

In the accompanying sheets of drawings which are illustrative of our invention—

Fig. 1 is a front elevation of a spinning frame having our improved parts applied thereto and shows the several parts in the positions that they respectively occupy during the operations of the machine.

Fig. 2 is an end elevation showing certain parts in section and with all the several devices in their respective positions shown by Fig. 1.

Fig. 3 is a sectional elevation similar to Fig. 2 but shows parts to the rear of other parts shown by said Fig. 2.

Fig. 4 is also an end elevation similar to Fig. 2 but illustrates the parts when the first movement has been taken to carry out the process of doffing.

Fig. 5 is also an end elevation similar to Fig. 4 but shows the several parts in their respective positions after the next step in the doffing process has been taken.

Fig. 6 is also a similar view to Fig. 5 but shows the several devices in position when the empty bobbins are ready to be carried into alignment with the spindles.

Fig. 7 is a plan of a slotted plate formed to lay-hold-of the caps as hereinafter explained, and shows said plate in the position to which it is taken by the first lateral step of its movements.

Fig. 8 is a similar plan to Fig. 7 but shows the position of the plate after its next step is taken.

Fig. 9 is a sectional end elevation of the plate and shows it in engagement with the cap.

Fig. 10 is a plan showing in detail a bifurcated member which engages the bobbins during certain parts of the "doffing" operations.

Fig. 11 is a sectional side elevation of the member shown by Fig. 10, when in position where it is engaging with the lower or base end of the bobbin.

Fig. 12 is a similar view to Fig. 11 but shows the relative positions of the bobbin and its engaging member hereinafter explained.

Fig. 13 is a plan illustrative of a device which engages the threads as same extend from their upper thread guides to the full bobbin after removal from their spindles.

Fig. 14 is a sectional elevation of the parts shown by Fig. 13.

Figs. 6 to 14 inclusive are drawn to an enlarged scale as compared with that to which the other figures are drawn.

A indicates the end frame of the machine, B the upper longitudinal rail and C the lower longitudinal rail which are fixed to the end frames A.

In carrying our invention into effect we make use of the usual spindle rail 2 upon which the series of spindles 3 are fixed and said rail 2 is arranged in well known manner to be raised and lowered by racks 4 being operated by pinions 5 which are fixed upon a shaft 6 all of which devices are old and well known to those having a knowledge of

cap spinning machinery having doffing mechanism.

As is shown we make use of a chain wheel 7 which is fixed upon the end of the shaft 6 in order that a chain 8 extending therefrom may take over another sprocket wheel 9 mounted to run loosely upon a stud 10 so that by said sprocket wheel 9 being fixed to the hand wheel 11 (which also revolves loosely upon the stud 10) rotary motion may, in known manner, be transmitted to the shaft 6 from the hand wheel 11 as and for the purpose hereinafter described.

Mounted to slide over the spindles 3 is a lifter plate 12 which is of known construction and extends lengthwise the machine so that by the usual operating mechanism said lifter plate 12 may be caused to rise and pass over the spindle 3 to effect what is known as the "building" of the coils of yarn on the bobbins in well known manner. The devices or mechanism employed for the purpose of operating the said lifter plate are also of the usual well known type.

Upon each of the spindles 3 is mounted the usual driving pulley or wharle 13 which receives its rotary motion by the driving tape or band in well known manner.

Secured to the upper surface of this wharle 13 is the usual metal tube over which the bobbin 14 is placed and through which the spindle 3 takes in order to support the well known cap 15 at its upper end.

According to our present invention we now form, in an appropriate position upon each cap 15, a radial flange 15^a which is for the engagement of a holding plate 16 shown by detailed drawing Figs. 8 and 9. The formation of the plate 16 is such that for each cap 15 a lateral opening is made at *b* in said plate to enable said plate to be moved laterally over the cap 15 and beneath the flange 15^a thereon as is shown by Fig. 7. Continued from each lateral opening *b* in the plate 16 is a slot *c* in order that when the plate 16 has been moved horizontally (as is hereinafter explained) to span the cap 15, as is shown by Fig. 7, by moving the plate 16 longitudinally each slot *c* therein will span the body of a cap while the edges of the slot will move beneath the flange 15^a on said cap 15 and the projecting pins *d* at the edge of the slot will extend above said flange 15^a and therefore retain the cap within the slot *c* as desired and as shown by Fig. 9.

The plate 16 is mounted so that it may slide longitudinally over its supporting bearings 17 and these bearings are fixed to horizontally disposed racks 18 which slide through bearings 19, 19^a fixed upon the framework of the machine. These racks 18 are actuated by toothed quadrants 20 which are fixed upon a shaft 21 extending lengthwise the machine. The brackets 17, racks 18, bearings 19 and quadrants 20 are all of well known arrangement with the slight alterations in their form to enable the plate 16 to slide over the brackets 17 longitudinally, otherwise the parts including the hand lever 22 which is fixed upon the shaft 21 and which is held in position by a curved bar 23 are well known and perform well known functions.

Instead of the hinged-board 24 usually styled the top board and through which openings 24^a are made for enabling same to guide the threads which pass between the delivery rollers 25 and 25^a we now hinge this board 24 upon an extending portion 17^a of the bracket 17 to enable said board 24 to be operated or be raised when the cap 15 is lifted as is hereinafter explained and as is shown by Figs. 4, 5 and 6 of the drawings.

To the rear of the series of spindles 3 is mounted the well known oscillating rod or shaft 26 upon which a bifurcated member 27 is mounted opposite each spindle 3, the number of said bifurcated members 27 therefore corresponding to the number of the spindles 3.

This bifurcated member 27, illustrated in detail by Figs. 10, 11 and 12 is formed with a flange *f* and *f* upon each prong so that by a slot *g* being formed in said flanges *f* a cross pin *h* may be arranged to slide therein the heads of the cross pin *h* being arranged to keep said pin within the slots or to prevent it from leaving same longitudinally.

About centrally of the pin *h* is fixed a series of members *k* preferably of hexagonal shape, the sides of these members being for engagement with the lower end of their respective bobbin 14 as is hereinafter described, one side or other of said hexagonal members being always in position so that by the pin *h* rotating freely in the slots *f* when the hexagonal members *k* come in contact with the base end 14^a of the bobbin 14 one face or another is adjusted against said base.

Pivoted upon bearings 12^a fixed to the lifter plate 12 is a longitudinal shaft 28 which extends lengthwise the machine and has projections 28^a extending from it as shown by Figs. 13 and 14 of the drawings, each one of said projections 28^a being for engagement with the thread in connection with each bobbin 14 as is hereinafter explained. The shaft 28 is capable of rotating in its bearings as well as being movable lengthwise through said bearings as same is operated by the handle 28^b.

Mounted on the front of the machine are the bearings 29 several of these being arranged along the front of the machine to meet the requirements of the number of devices that are to be used in connection therewith and in manner well known. Arranged to slide through or upon each of said bearings 29 is a vertical rack 30, and each of these vertical racks 30 has at its upper end lateral-

ly and vertically projecting arms 30^a and 30^b.

Upon the arm 30^a is pivoted at 30^c another arm 31 which extends somewhat horizontally to support the longitudinal rail 32 upon which are fixed pegs 33 to receive the empty bobbins 14 thus the rail 32 will support the series of pegs 33 the number of said pegs 33 corresponding with the number of the spindles 3 while each peg has adjoining it a supporting piece 33^a which extends to support the bobbin 14 as shown by the drawings. The supporting of the bobbin 14 in the position shown by Figs. 3 and 4 is to enable the multifaced member *k* on the bifurcated member 27 to come in contact with the base 14^a of the bobbin 14.

Extending from the lever 31 is a projection 34^a that has pivoted to it at 34^b a connecting rod 35. This connecting rod 35 extends vertically so that a quadrant slot 35^b formed therein may take over a pin 35^a fixed upon a lever 36 which is fixed upon a shaft 37. The shaft 37 is preferably rectangular in cross section and has fixed to it a series of pegs 38 said series of pegs 38 corresponding in number with the number of pegs 33 carried by the rail 32.

The shaft 36 is pivoted upon extensions from the racks 30 and the lever 36 at the end of said shaft 37 locates the position of said shaft 37 by projections 35^c, 35^d coming in contact with the end frame A as same may be adjusted as is hereinafter explained.

Pivoted to the lever 31 at 40^a is a catch piece 40 having a handle 40^b and this catch piece 40 engages with a projecting pin 30^d which is fixed to the extension 30^a of the rack 30.

When the lever 31 and the rail 32 which it supports, are situated in the positions shown by Fig. 3 the outermost of the notches in the catch piece 40 is in engagement with the retaining pin 30^d whereas when the said devices are adjusted in the position shown by Fig. 4 then the other notch is in contact with the said pin 30^d.

The racks 30 are actuated by pinions 42 engaging therewith and said pinions 42 are fixed upon a shaft 43 which extends lengthwise the machine while upon the same shaft 43 is fixed a handle 44 as shown by Fig. 6.

The operations of the foregoing parts are as follows:—

After the winding operations have been completed so that the full bobbins are ready for displacement, the attendant operates the hand wheel 11 in order to actuate through the chain 8 and other devices above referred to, the rail 2 which carries the spindles. The operation of said rail 2 is to cause it to move vertically to carry the spindles 3, bobbins 14 and caps 15 into the highest position shown by Fig. 4.

Prior to reaching this highest position he will have moved the bifurcated member 27 so that the two bifurcations will rest upon the upper flange on the wharle 13 he will then complete the movement vertically after which the plate 16 will be slid longitudinally so that the slots *c* therein are caused to receive the caps 15 as is shown by Fig. 6 of the drawings at which time the pegs *d* will engage with the flanges 15^a on the caps 15 to prevent same from moving out of position.

The vertical movement of the spindles, caps and lifter plate into the highest position where the caps are shown by Fig. 4 has the effect of enabling the upper flange of the wharle 13 bringing the bifurcated member 27 into its horizontal position when it will retain its respective bobbin as desired. (The engaging of the bifurcations with the upper flange of the wharle 13 when in the position first engaged with by said bifurcations enables the hexagonal members *k* to fall into contact with and therefore to retain the bases 14^a of the bobbins 14.) The bifurcated members 27 will be retained in the horizontal position by the handle which operates the shaft engaging with the usual device. The spindle rail 2 is then lowered to its lowest position so that all the spindles are clear of the under-side of the bobbins' heads. This is effected by reversal of the direction of motion of the hand wheel 11. The handle 22 is then actuated in order to bring the bearings 17, plates 16 and all the caps 15 and bobbins 14 which are supported by the devices described into the forward position shown by Fig. 5 thus the pegs 38 are in position to receive said bobbins. The handle 44 is then actuated and the racks 30 raised vertically so that the ends of the pegs 38 enter the lower ends of the bobbins. The attendant then actuates the handle 26^k and removes the bifurcations 27 from supporting the bobbins thus said bobbins will descend on to the pegs 38 said pegs 38 are then lowered in order that the said pegs 38 may be brought clear and away from beneath the caps 15 while simultaneously the pegs 33 thus have brought the empty bobbins into alignment with said caps and by raising same into position will carry the bobbins into the caps on which the bifurcated arms 27 again engage the empty bobbins and retain them within the caps so that the pegs 33 may then be withdrawn. The bobbins are thus retained by the bifurcated members within the caps so that said caps and said bobbins along with their supports may be caused to recede to their starting position shown by Fig. 4 at which time the full bobbins will remain close to the lifter rail of the machine and the empty pegs will occupy the position shown by Fig. 4. The hand wheel 11 is then actuated to cause the spindle rail and its spindles to ascend to their high-

est position to enter the bobbins and receive the caps at their upper ends after which said spindle rail is lowered into its operating position after the bifurcated members have been withdrawn to let the bobbins fall by their weight on to said spindles. The attendant then will actuate the handle 44 so that the racks are brought into position for the full bobbins to approach the lifter rail but will then slide the shaft 28 longitudinally in order that the fingers thereon may engage the threads of yarn so that on revolving said shaft 28 said fingers will carry the threads of yarn against the upper flanges of the wharles 13 so that the notches 13^a therein may lay hold of said threads. He then readjusts the several parts and restarts the machine into operation at which time the rotary motion of the wharle 14 will lay hold of the loose threads, sever same and wind them on to the bobbins so that the full operations may then continue.

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

1. In doffing mechanism for cap spinning machines, a vertically movable spindle rail, means for actuating said spindle rail, spindles fixed upon said spindle rail, a lifter plate taking over said spindles, wharles mounted upon said spindles, bobbins supported and operated by said wharles, caps mounted upon the upper ends of said spindles, each of said caps having a lateral flange formed upon it, means for engaging said flange to support the cap, devices for actuating said means, members for engaging the lower ends of the bobbins within the caps and means for operating said members, two series of pegs for receiving the full and empty bobbins, a rail mounted upon lever arms supporting one series of pegs, an oscillating shaft supporting the second series of pegs, a lever fixed to said shaft, a slotted connecting link coupling the lever supporting the first rail to the lever fixed upon said shaft, means for actuating said levers, bearings upon which said levers and the shaft are pivoted, and means for raising and lowering said bearings for the purpose described.

2. In doffing mechanism for cap spinning machines, a vertically movable spindle rail, means for actuating said spindle rail, spindles fixed upon said spindle rail, a lifter plate taking over said spindles, wharles mounted upon said spindles, bobbins supported and operated by said wharles, caps mounted upon the upper ends of said spindles, each of said caps having a lateral flange formed upon it, a slotted plate for spanning the caps and engaging the flanges thereon, devices for actuating said slotted plate, members for engaging the lower ends of the bobbins within the caps and means for operating said members, two series of pegs for receiving and operating the full and empty bobbins, a rail mounted upon lever arms for supporting one series of pegs, an oscillating shaft for supporting the second series of pegs, a lever fixed to said shaft, a slotted connecting link coupling a lever supporting the first rail to the lever fixed upon the peg shaft, bearings upon which said levers and the shaft are pivoted, and means for raising and lowering said bearings for the purpose described.

3. In doffing mechanism for cap spinning machines, a vertically movable spindle rail, means for actuating said spindle rail, spindles fixed upon said spindle rail, a lifter plate taking over said spindles, wharles mounted upon said spindles, bobbins supported and operated by said wharles, caps mounted upon the upper ends of said spindles, each of said caps having a lateral flange formed upon it, means for engaging said flange to support the cap, devices for actuating said means, bifurcated members for engaging the lower ends of the bobbins within the caps, means for operating said members, slidable and rotatable cross pins carried by said bifurcated members, hexagonal devices mounted upon said cross pins, two series of pegs for receiving full and empty bobbins, a rail mounted upon lever arms supporting one series of pegs, an oscillating shaft supporting the second series of pegs, a lever fixed upon said shaft, a slotted connecting link coupling a lever supporting the first rail to the lever fixed upon the peg shaft, bearings upon which said levers and the shaft are pivoted, and means for raising and lowering said bearings for the purpose described.

4. In doffing mechanism for cap spinning machines, a vertically movable spindle rail, means for actuating said spindle rail, spindles fixed upon said spindle rail, a lifter plate taking over said spindles, wharles mounted upon said spindles, bobbins supported and operated by said wharles, caps mounted upon the upper ends of said spindles, each of said caps having a lateral flange formed upon it, means for engaging said flange to support the cap, devices for actuating said means members for engaging the lower ends of the bobbins within the caps, means for operating said members, two series of pegs for receiving full and empty bobbins, a rail mounted upon lever arms supporting one series of pegs, a shaft arranged to oscillate upon bearings and having an arm extending therefrom, coupling links between a lever carrying said peg rail and the arm fixed upon said peg carrying shaft, so that simultaneous action is secured, bearings upon which said levers and shaft are pivoted, and means for raising and lowering said bearings, for the purpose described.

5. In doffing mechanism for cap spinning

machines, a vertically movable spindle rail, means for actuating said spindle rail, spindles fixed upon said spindle rail, a lifter plate taking over said spindles, wharles mounted upon said spindles, bobbins supported and operated by said wharles, caps mounted upon the upper ends of said spindles, each of said caps having a lateral flange formed upon it, means for engaging said flange to support the cap, devices for actuating said means, members for engaging the lower ends of the bobbins within the caps and means for operating said members, two series of pegs for receiving full and empty bobbins, a rail mounted upon lever arms and supporting one series of pegs, an oscillating shaft supporting the second series of pegs, a lever fixed upon said shaft, a slotted connecting link coupling a lever supporting the first peg rail to the lever fixed upon the peg shaft, bearings upon which said levers and the shaft are pivoted means for raising and lowering said bearings, a rotatable shaft or rod mounted upon the lifter plate, bearings for said shaft or rod which permit longitudinal motion to be transmitted to said rod, projections extending from said rod to engage with the threads, and means for rotating and sliding said rod.

ALFRED STELL.
JOHN STELL.
HENRY WELCH.