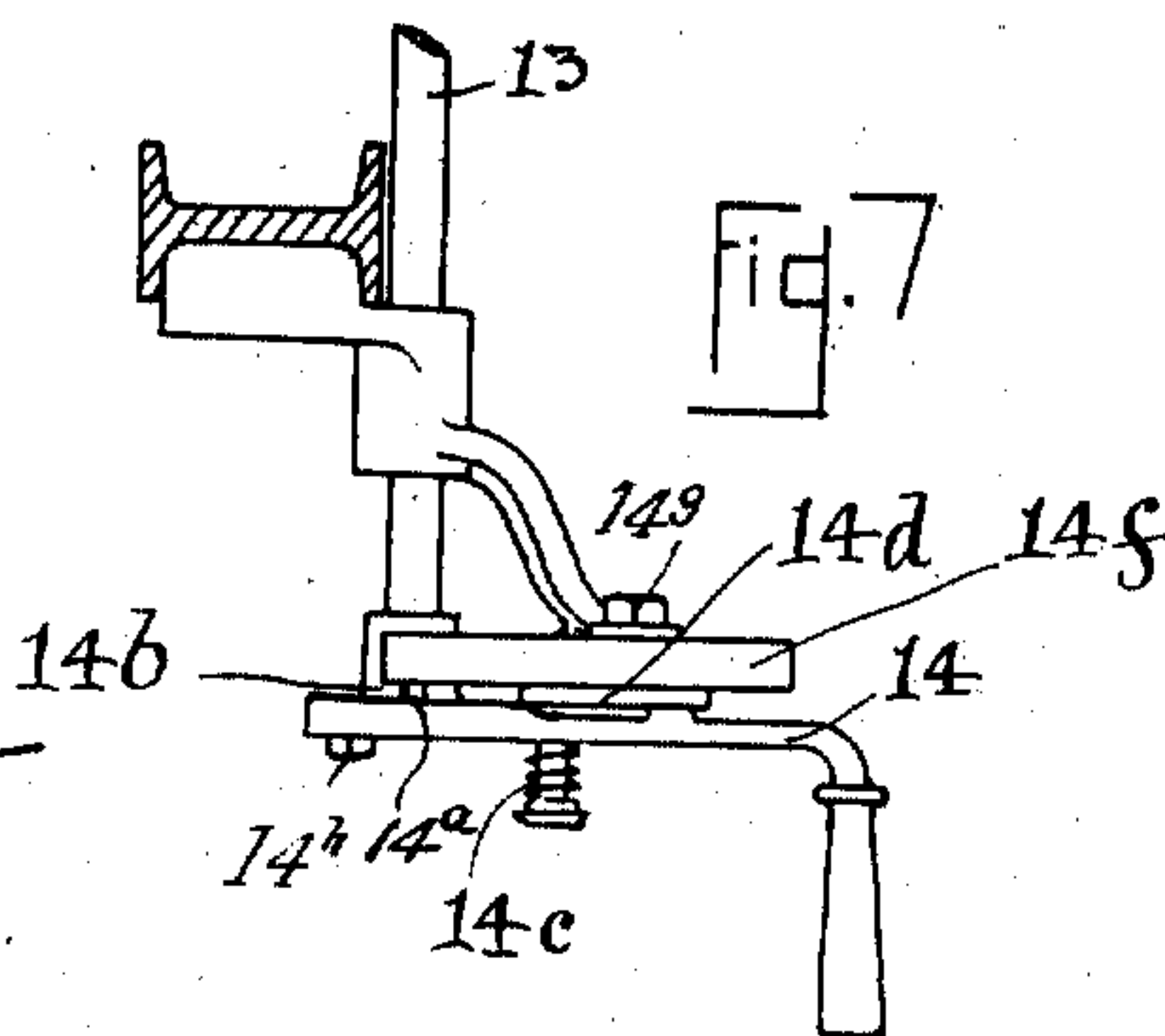
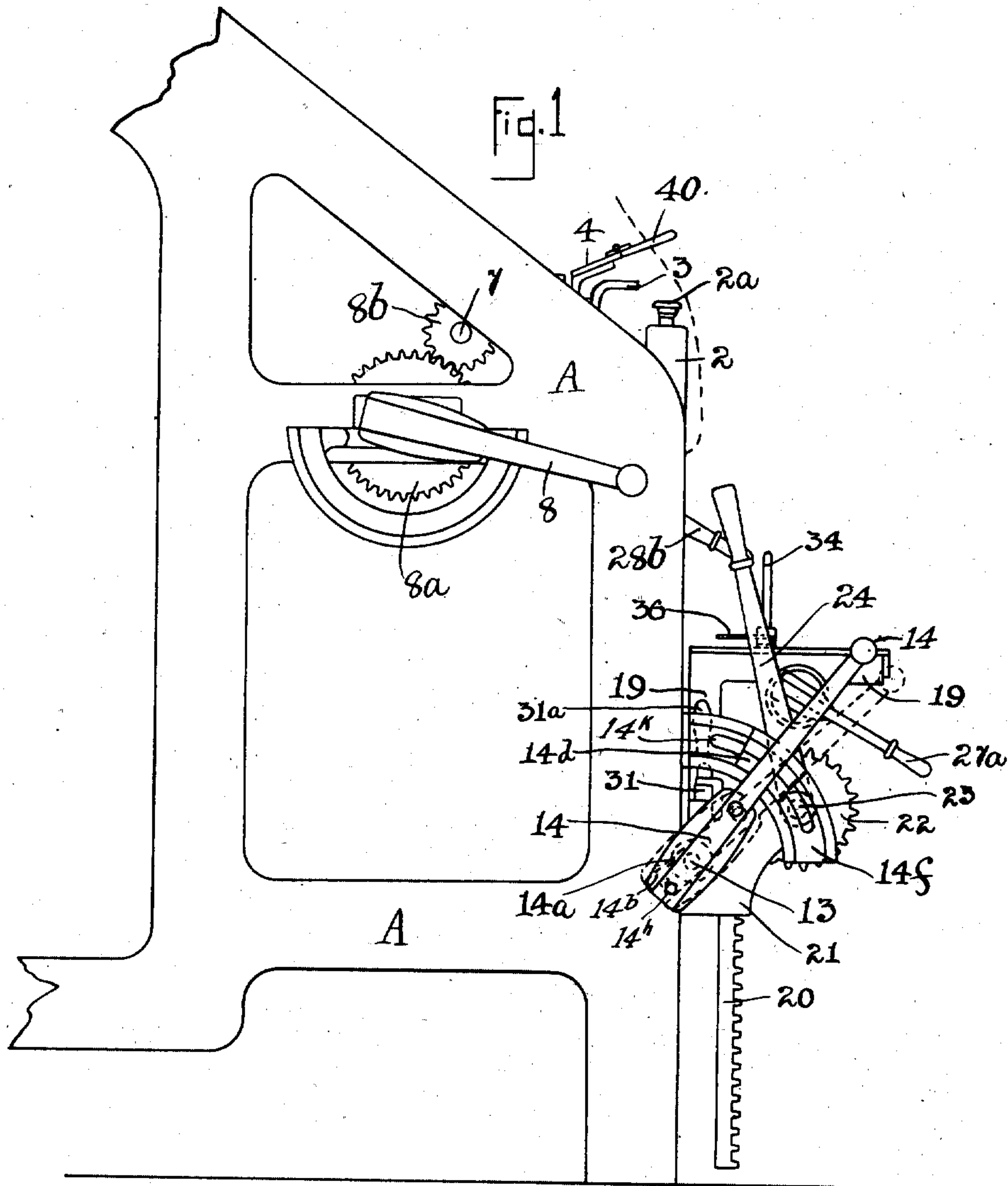


A. & J. STELL.  
SPINNING MACHINE.  
APPLICATION FILED JAN. 27, 1909.

993,565.

Patented May 30, 1911.

4 SHEETS—SHEET 1.



Witnesses  
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Alfred Stell  
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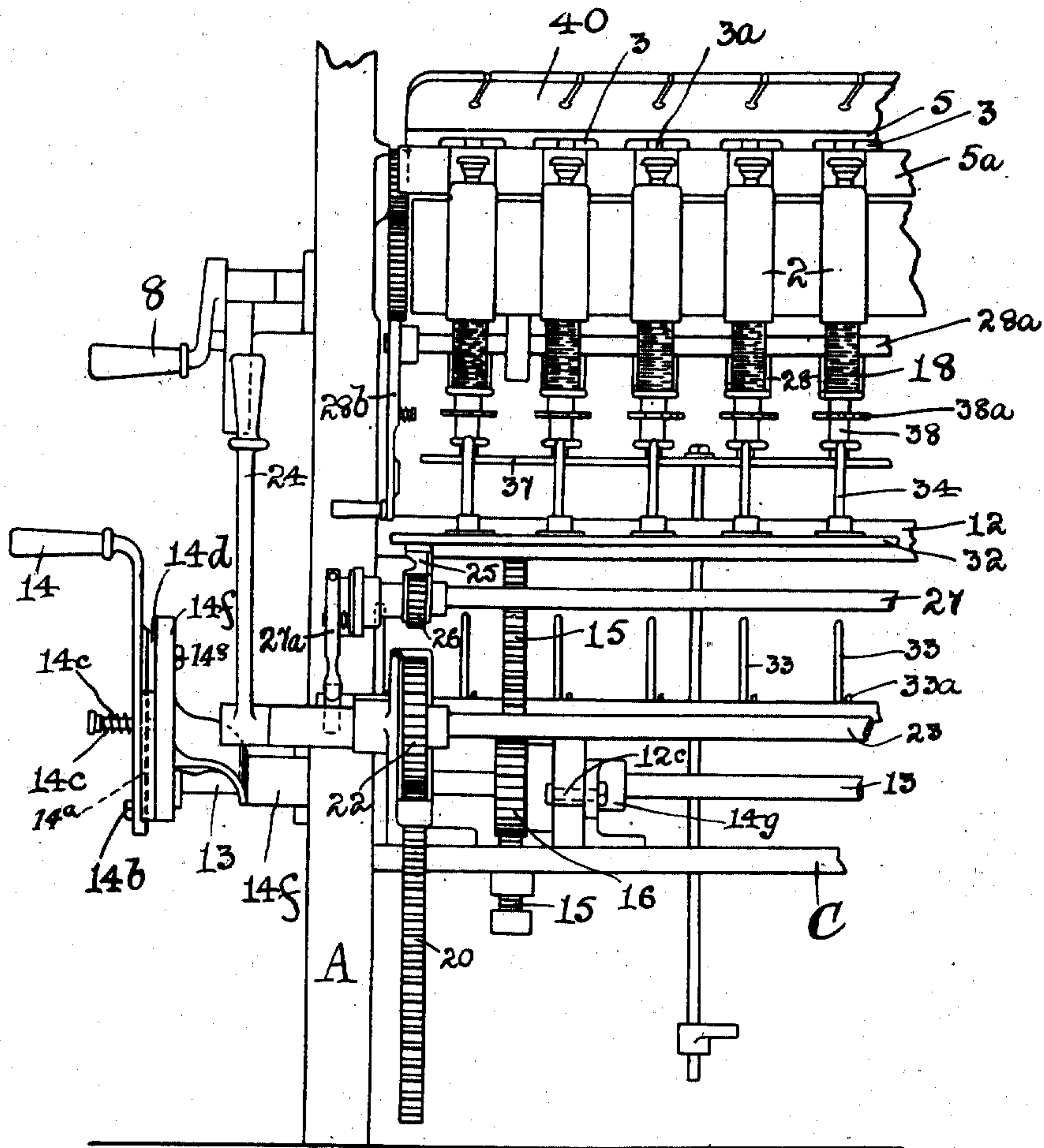
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4 SHEETS—SHEET 2.

Fig. 2



Witnesses

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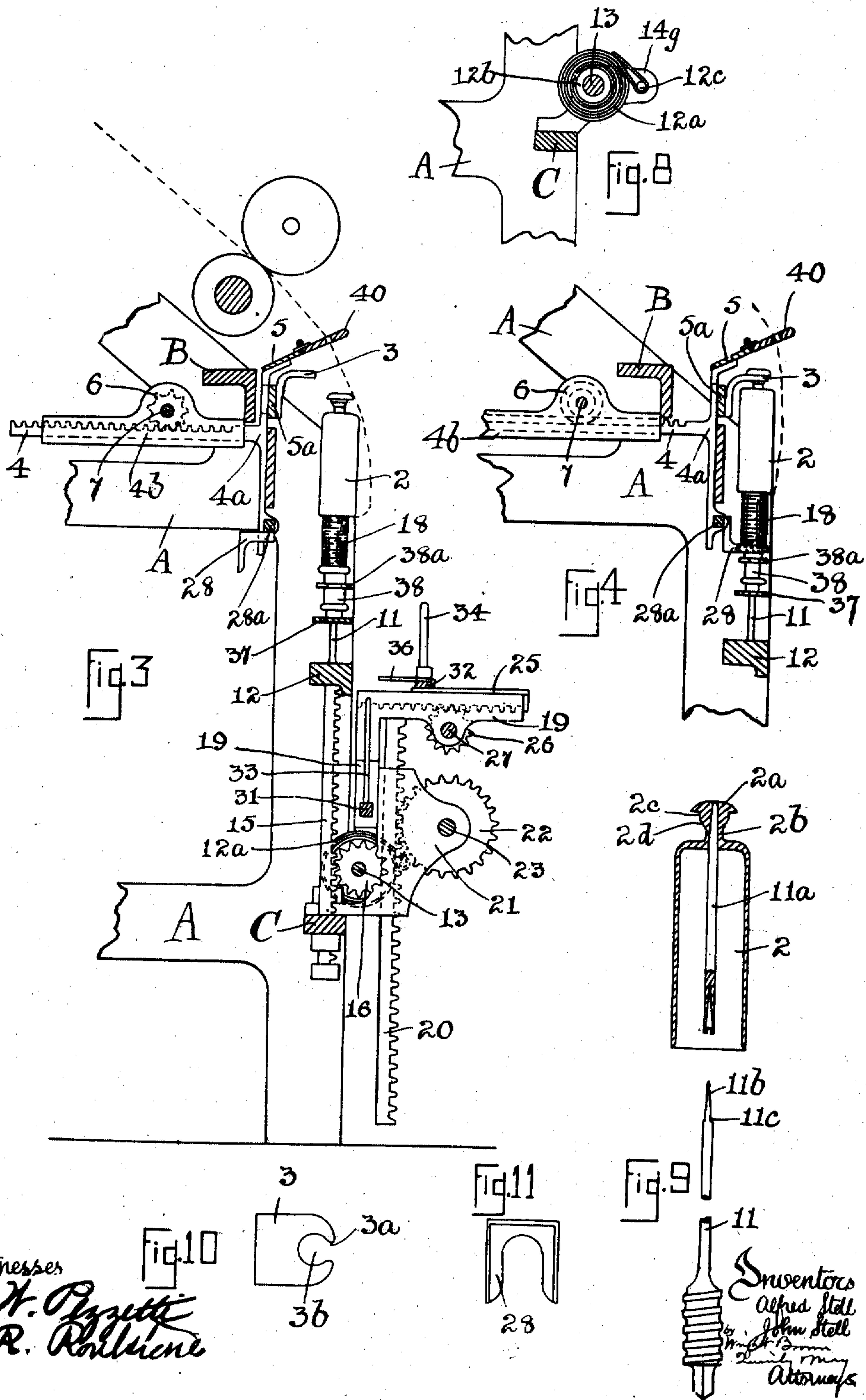
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4 SHEETS-SHEET 3.



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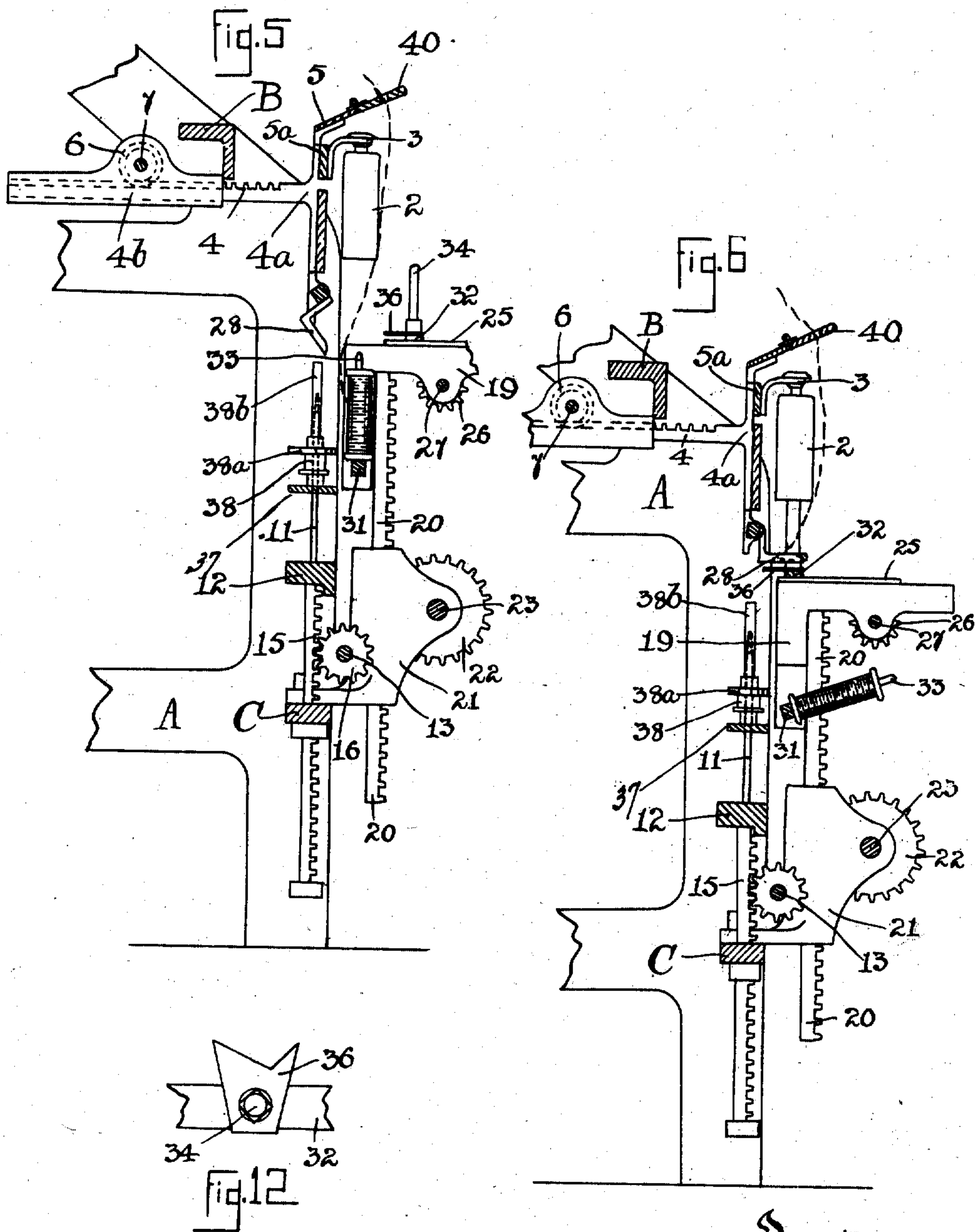
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# UNITED STATES PATENT OFFICE.

ALFRED STELL, OF STEETON, NEAR KEIGHLEY, AND JOHN STELL, OF KEIGHLEY, ENGLAND.

## SPINNING-MACHINE.

993,565.

Specification of Letters Patent.

Patented May 30, 1911.

Application filed January 27, 1909. Serial No. 474,615.

*To all whom it may concern:*

Be it known that we, ALFRED STELL and JOHN STELL, subjects of the King of Great Britain, and residing, respectively, at 5 Greenhill, Steeton, near Keighley, in the county of York, England, and 30 Devonshire street, Keighley aforesaid, have invented certain new and useful Improvements in Spinning-Machines, of which the following description, together with the accompanying sheets of drawings, is a specification.

This invention relates to "doffing" mechanism for machines of the class well known as "cap" spinning, doubling, twisting and 15 like frames, the same being used in the production of yarns or threads of fibrous substances said mechanism being used for carrying out the process of "doffing", that is to say, for simultaneously effecting the removal of all the full bobbins from their spindles and then for placing thereon empty bobbins with the yarns or threads so secured that the spinning or like operations may be 20 restarted. And our said invention consists in an improved method of constructing the spindles and their caps and of means for laying-hold-of said caps and the bobbins within them to remove them from their spindles, together with counterbalancing devices for counteracting the weight of the spindles and their supporting rail so that by the employment of comparatively few parts we are enabled to carry out the whole process 25 of doffing and said parts or mechanisms are not so liable to get out of order as are those heretofore made use of.

The object of our invention is attained as hereinafter described with reference to the 40 accompanying sheets of drawings, wherein:

Figure 1 is an end elevation of sufficient of a cap-spinning frame to illustrate the formation and arrangement of our improved parts. Fig. 2 is front elevation of certain 45 of the parts shown by Fig. 1. Fig. 3 is a sectional end elevation of the devices illustrated by Fig. 1 and shows the several parts in the positions they occupy during the process of spinning. Fig. 4 is a similar view to Fig. 3 but shows the parts in position as 50 when the caps and full bobbins are being laid-hold-of prior to the withdrawal of the spindle and tubes from within them. Fig. 5 is also a similar view to Fig. 3, but shows 55 the several parts in their respective positions

when the full bobbins have been allowed to descend on to their series of pegs for retaining them as hereinafter explained. Fig. 6 is also a similar view to Fig. 3 but shows the several parts in positions where the empty 60 bobbins have been placed within their respective caps. Fig. 7 is a plan showing certain hand lever devices hereinafter described. Fig. 8 is a sectional end elevation illustrating the method of mounting the 65 counterbalancing springs. Fig. 9 is a sectional elevation showing a cap and its spindle as constructed in accordance with our invention. Figs. 10, 11 and 12 are plans of parts hereinafter referred to. 70

Similar letters and figures of reference indicate similar parts throughout the several views.

A indicates the end frame of the machine and B and C the upper and lower longitudinal rails, respectively, which are fixed to 75 said end frames A.

The caps 2 have portions 11<sup>a</sup> of the spindles 11 fixed to them, and the lower ends of said portions 11<sup>a</sup> are bored in an appropriately tapering form to receive the tapering 80 ends 11<sup>b</sup> of the spindles 11, while the downwardly extending end of the portions 11<sup>a</sup> are made in the form of a coupling to engage with the coupling part 11<sup>c</sup> on the spindle 11, 85 thus when said portions 11<sup>a</sup> are mounted upon the ends 11<sup>b</sup> the caps 2 are supported in alinement with the spindles 11 and are held against rotation thereon by the coupling part 11<sup>c</sup>. These formations are shown by 90 Fig. 9.

The upper ends of the caps 2 have heads 2<sup>a</sup> formed upon neck parts having straight portions 2<sup>b</sup> of small diameter, and other straight portions 2<sup>c</sup> of larger diameter, 95 while these are joined together by intermediate portions 2<sup>d</sup> which are of tapering form. By forming the neck portions of this shape, the cap-holders 3 may have their notches 3<sup>a</sup> passed over the parts 2<sup>b</sup> until the 100 circular parts of the openings 3<sup>b</sup> lie beneath the larger portions 2<sup>c</sup> so that on the caps 2 being lowered or allowed to descend the tapering parts 2<sup>d</sup> will guide them until the parts 2<sup>c</sup> fall into and fill the circular open- 105 ings 3<sup>b</sup> in the holders 3, thus said caps 2 and their portions of spindles 11<sup>a</sup> are thereby held in perfectly vertical positions which enables the ends 11<sup>b</sup> of the spindles 11 to be withdrawn therefrom and afterward re- 110



turned into them without disturbing or displacing any of said caps 2 from their holders 3.

The cap-holders 3 and the thread guides 40 are mounted upon rails 5 and 5<sup>a</sup> which are secured to the outer ends 4<sup>a</sup> of racks 4 so that as said racks are moved backward and forward through their bearings 4<sup>b</sup>, said rails 5 and 5<sup>a</sup> will carry said guides 40 and holders 3 in the said directions.

The racks 4 are actuated by the pinions 6 which are fixed upon the shaft 7 and this shaft 7 is rotated whenever the attendant moves the handle 8, since this handle will transmit its motion to the wheel 8<sup>a</sup> which gears with the pinion 8<sup>b</sup> also secured on the shaft 7.

On the lower ends of the extensions from the racks 4 is a shaft 28<sup>a</sup> which is square or about square in cross section (and extends lengthwise the frame) so that shoes 28 may be more easily fixed to it. This shaft 28<sup>a</sup> is arranged to have round neck parts taking into its bearings so that it may be oscillated by the hand lever 28<sup>b</sup> in order to bring its shoes 28 (which correspond in number with that of the spindles 11) beneath the bobbins 18 when same are within the caps 2 as shown by Figs. 4 and 6, where said shoes 28 will support them until they are required to descend.

The whirls 38 and their usual tubes 38<sup>b</sup> are mounted in the ordinary manner to revolve freely upon the spindles 11. These spindles 11 are fixed in the rail 12, and this rail 12 is arranged so that it may be moved up and down by its racks 15 engaging with pinions 16 secured upon the shaft 13. This shaft 13 is mounted to rotate in bearings 14<sup>x</sup> so that by the attendant moving the hand lever 14 (which is fixed upon said shaft 13) it may be actuated to cause the racks 15 to raise or depress the rail 12 as hereinafter described.

The handle 14 is loosely mounted on a stud or screw 14<sup>b</sup> and provided with a projection adapted to enter a notch 14<sup>a</sup> in a hub 14<sup>b</sup> secured to the shaft 13. The said projection is normally held in engagement with the notch 14<sup>a</sup> by means of the spring 14<sup>c</sup> there being sufficient play to permit the lever to be so moved as to disengage the projection from said notch to permit the lever to be moved back and forth to raise and lower the spindle rail. Mounted on a quadrant bearing 14<sup>f</sup> is a notched block 14<sup>d</sup>, said quadrant being provided with a slot 14<sup>k</sup> curved in an arc with the shaft 13 as its center. The block 14<sup>d</sup> may be adjusted in said slot to any desired position and is secured in its adjusted position by the nut 14<sup>g</sup>. The block 14<sup>d</sup> is also provided with a notch adapted to engage a complementary projection on the handle 14 so that when the two projections on said handle engage the notch

14<sup>a</sup> and the notch in the block 14<sup>d</sup> the handle is locked against movement. By the foregoing arrangement the block 14<sup>d</sup> may be adjusted to any desired position and in this manner the position of the spindle rail during the spinning operation may be minutely adjusted according to the yarns being spun.

We may here remark that the above described facilities for adjusting the rail 12 at a higher or lower position and retaining same in such adjusted position by said adjustable notched piece 14<sup>d</sup> are of great importance apart from their use in connection with the specific "doffing" mechanism, since by the employment of the easily adjusted notched piece 14<sup>d</sup> the rail 12 and its spindles 11 may be regulated according to the conditions or requirements that the nature of the fibrous substances being treated may demand as is well known to all who are experienced in the use of this type of spinning machine.

To counterbalance the weight of the rail 12 and all the parts it carries, we make use of coiled springs 12<sup>a</sup> one end of each of which we secure to a hub 12<sup>b</sup> fixed upon the shaft 13, while the other end we secure to a projecting pin or bolt 12<sup>c</sup> fixed to the bracket 14<sup>e</sup> as shown by Figs. 2 and 8.

In the bearings 21 racks 20 are mounted to slide, also in a vertical direction, and their movements are effected by pinions 22 secured to a shaft 23 which extends lengthwise the machine so that it may have as many pinions 22 secured to it as there are racks 20, the number of both being regulated by the length of the machine; the longer the machine the greater will be the number as will readily be understood. The shaft 23 is actuated by the handle 24. The upper ends of these racks 20 have parts 19 secured to them so that other racks 25 may be mounted to slide horizontally thereon, while said parts 19 also act as bearings for the shaft 27 upon which pinions 26 are fixed, the same being arranged to engage with the racks 25.

The racks 25 are arranged to have a bar 32 secured to them, and this bar 32 extends lengthwise the machine to have as many pegs 34 secured to it as there are spindles 11 in the machines. On the same bar 32 and beneath the pegs 34 are fixed thread guides 36 of the shape known by Fig. 12. To transmit horizontal motion to the bar 32 to cause it to carry its pegs 34 farther from or nearer to the spindles 11 as hereinafter described, the shaft 27 has a handle 27<sup>a</sup> fixed upon it.

Mounted to rock in the parts 19, is a shaft 31 of an appropriate shape in cross section to receive a series of pegs 33 which are secured to it, and adjoining each peg 33 in said series of pegs is a shorter peg 33<sup>a</sup>, so that when the full bobbins 18 are placed



over or upon said pegs 33, the pegs 33<sup>a</sup> will take into grooves made in the end flanges of said bobbins 18 and so hold same against rotation. The handle 31<sup>a</sup> is fixed upon the shaft 31 in order to enable the attendant to adjust said shaft 31 with its pegs 33 in their vertical position as shown by Figs. 2, 3 and 5 or in their position at an angle thereto as shown by Fig. 6 in which latter position facilities are afforded for the more easy removal of the full bobbins 18 when the attendant has to transfer them to other machines.

The actions of the foregoing parts are as follows:—On the completion of the spinning operations when the bobbins 18 have had the desired quantity of yarn wound upon them (a series of empty bobbins already having been placed upon the pegs 34) the motion of the machine is arrested and the handle 14 is moved a little to the right, as shown in broken lines Fig. 1, thereby raising the rail 12 its spindles 11 and caps 2 into the position shown by Fig. 4. The handle 8 is then actuated to advance the holders 3 to lay-hold-of the caps 2, and then the handle 28<sup>b</sup> is moved to oscillate the shaft 28<sup>a</sup> and cause the shoes 28 to pass beneath the bobbins 18 while they are within the caps 2, also as shown by Fig. 4. The rail 12 and the lifter rail 37 (which is of the ordinary well known type and is actuated by the usual mechanism) are then lowered to their lowest positions as shown by Figs. 5 and 6. The full bobbins will thus be left within the caps 2, and these are then advanced to the position shown by Figs. 5 and 6 so that the central openings through the bobbins are vertically over the pegs 33, the handle 24 is then actuated to cause the pegs 33 to rise into the openings within the bobbins 18 in said position, on which the shoes 28 are withdrawn and said bobbins are allowed to fall freely on to said pegs 33. By actuating the handle 27<sup>a</sup> the empty bobbins are then brought beneath the caps 2 and by moving the handle 24 they are raised into same, on which the shoes 28 are moved into position beneath said empty bobbins so as to retain them within their caps 2 as shown by Fig. 4. The pegs 34 are then withdrawn by actuating the handle 27<sup>a</sup>. After this the racks 4 are caused to recede until the empty bobbins are brought vertically over the spindles 11 on which said spindles 11 and their tubes 38<sup>b</sup> are raised to enter the openings in said bobbins and for the spindles 11 to enter and be coupled to those 11<sup>a</sup> within the caps 2 so that at such time the caps 2 and their bobbins are supported by the spindles 11 and the lifter rail 37 and therefore the holders 3 may be withdrawn and adjusted in their original position as shown by Fig. 3. The spindle rail 12 and lifter rail 37 are then adjusted in their

proper working positions, and the bar 31 is tilted into its position shown by Fig. 6. The bar 32 is then advanced so that its thread guides 36 will carry the threads extending from the bobbins 18 on the pegs 33 beneath the flanges 38<sup>a</sup> on the whirls 38 on which the machine is started into motion and by the notches in said flanges 38<sup>a</sup> laying-hold-of the threads pressed against them, these latter are carried around and secured to the bobbins on the spindles 11. The rotary motions of these bobbins at this time cause the threads to break on account of the bobbins on the pegs 33 being held against rotation. The bar 32 is then removed from its position near the whirls 38 and is adjusted in the position shown by Fig. 3.

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

1. In doffing mechanism for cap-spinning-machines caps having portions of spindles fixed within them, spindles fixed in a movable rail to engage with the spindles within the caps, holding devices for supporting said caps when the spindles beneath are withdrawn, means for actuating said holders and the rail carrying the spindles, substantially as herein specified.
2. In doffing mechanism for cap-spinning-machines, caps having heads with intervening neck parts of two diameters connected by an intermediate tapered part, holding devices formed to take over the smaller parts of the necks so that larger openings in them may receive the larger diameters of said necks which are guided therein by said tapering parts, devices for actuating said holders, and means whereby the caps are brought into position to be engaged with by same substantially as set forth.
3. In doffing mechanism for cap-spinning-machines, caps mounted to be detachable from their spindles, spindles for supporting said caps, a bearing rail for said spindles, means for moving said rail vertically, devices for laying-hold-of and supporting the caps when their spindles are withdrawn, movable shoes adapted to support the bobbins when the latter are within the caps, and means for actuating said shoes substantially as set forth.
4. In doffing mechanism for cap-spinning machines, caps detachable from their spindles, devices for supporting said caps when their spindles have been withdrawn, devices for supporting bobbins in said caps when said spindles are withdrawn, a movable rail upon which the spindles are fixed, mechanism for adjusting said rail and including an operating handle, and means operatively connected with said mechanism for counterbalancing said rail and parts carried thereby.
5. In a cap-spinning-machine, detachable



caps, spindles supporting said caps, a movable rail upon which the spindles are fixed, hand lever devices by which said rail may be actuated, means for connecting said hand-lever-devices to said rail to enable same to be actuated thereby, a notched locking piece constructed to be adjustable on its supports so that said hand lever may engage with it in any of its adjusted positions substantially as set forth.

6. In doffing mechanism for cap spinning machines, caps detachable from their spindles, spindles for supporting said caps when same are in their operating positions, vertically movable rails upon which said spindles are secured, devices for actuating said rails to withdraw said spindles, holders adapted to engage said caps to support them, when the spindles are withdrawn means for oscillating said shoes, devices whereby the bobbins may be supported within their caps when the spindles and parts are withdrawn, means whereby the caps containing the bobbins and the devices for holding same may be moved horizontally, a series of pegs mounted upon a bar carried by supports that may be raised and lowered to enable the series of pegs to receive the series of bobbins when the devices for supporting said bobbins within their caps are removed and devices for actuating same substantially as set forth.

7. In doffing mechanism for cap-spinning-machines, caps detachable from their spindles, said spindles, means whereby motion may be transmitted to these spindles in a vertical direction, devices for engaging with the caps, means whereby motion may be transmitted to the cap holding devices in a horizontal direction, devices for securing the thread guides to the parts which move the caps horizontally, a series of pegs for receiving the full bobbins, rotary bearings for said series of pegs, means whereby they may be adjusted in a vertical position or one at an angle thereto, and means whereby they may be raised and lowered substantially as set forth.

8. In doffing mechanism for cap-spinning-machines, detachable caps, spindles for supporting same, devices for engaging with said caps to enable the withdrawal of their spindles, means for carrying and adjusting the series of caps in a horizontal direction, a series of pegs for supporting empty bobbins to be supplied to said caps, devices for moving said series of pegs in the vertical and horizontal planes, shoes adapted to engage said bobbins whereby they may be retained within the caps when placed therein and means for oscillating said shoes substantially as set forth.

9. In doffing mechanism for cap-spinning-machines, detachable caps, spindles for supporting same and provided with wheels having notched flanges, means for attaching said caps, a rail supporting said spindles, a lever for moving said rail, means for adjustably limiting the movement of said lever, a series of pegs for receiving the full bobbins when removed from the caps, means for preventing rotation of said full bobbins when mounted on said pegs, thread guiding and holding devices for conducting the threads into engagement with the notched flanges on said wheels.

10. In doffing mechanism for cap-spinning-machines, detachable caps, spindles for supporting same and provided with wheels having notched flanges, means for detaching said caps, a rail supporting said spindles, a lever for moving said rail, means for adjustably limiting the movement of said lever, means for securing bobbins within said caps when the spindles have been withdrawn, devices for receiving the full bobbins, and devices for supplying empty bobbins.

In testimony whereof we have affixed our signatures in presence of two witnesses.

ALFRED STELL.  
JOHN STELL.

Witnesses:

CHAS. FELL,  
SAMUEL HEY.