B. A. PETERSON.

MACHINE FOR DOFFING SPINNING FRAMES.

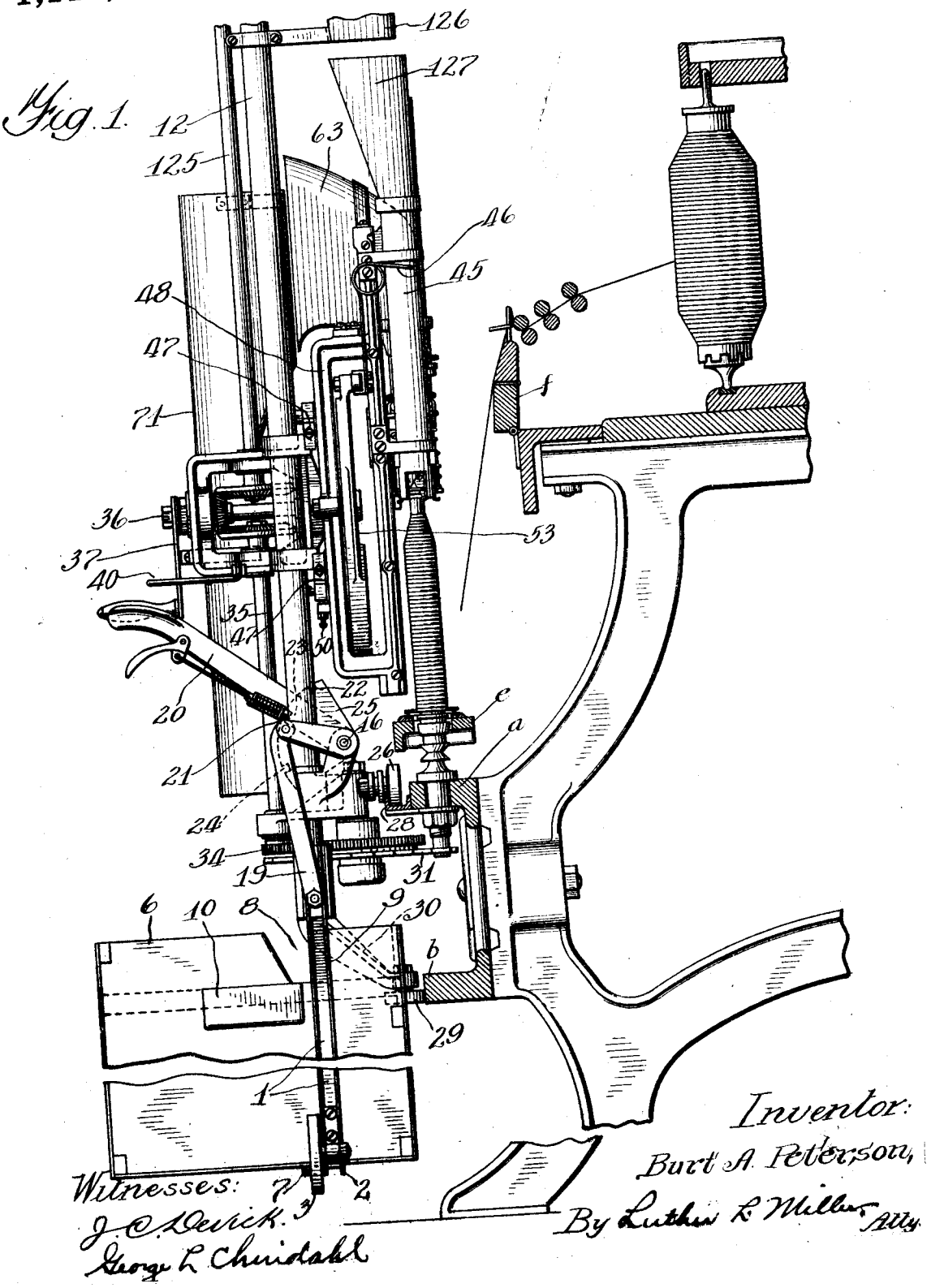
APPLICATION FILED DEC. 2, 1910.

Patented Nov. 3, 1914.

10 SHEETS—SHEET 1.

1,115,564.

Fig. 1.



Witnesses:

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Inventor:

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By Luther L. Miller Atty.

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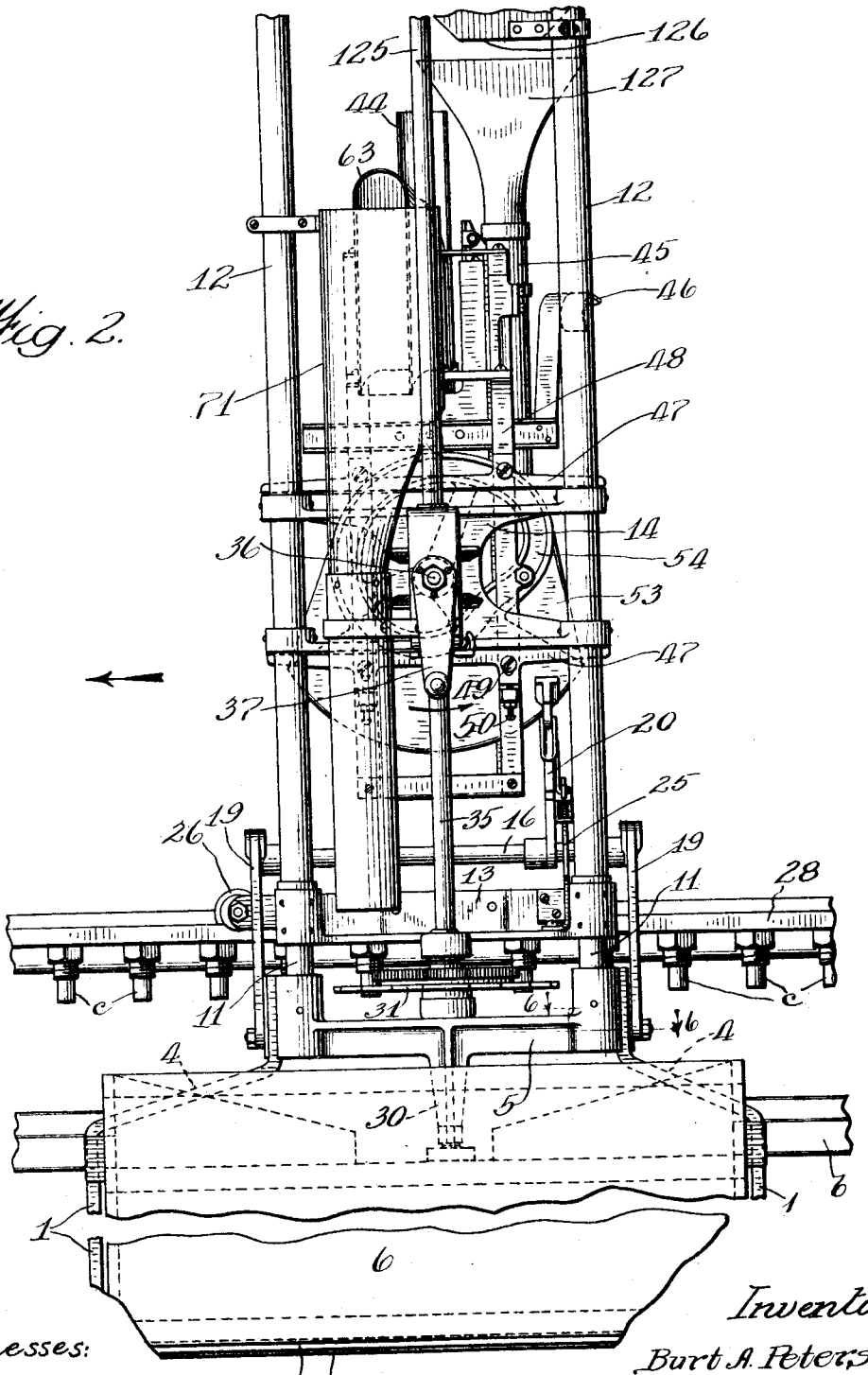
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1,115,564.

10 SHEETS—SHEET 2.

Fig. 2.



Witnesses:

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10 SHEETS—SHEET 3.

1,115,564.

Fig. 3.

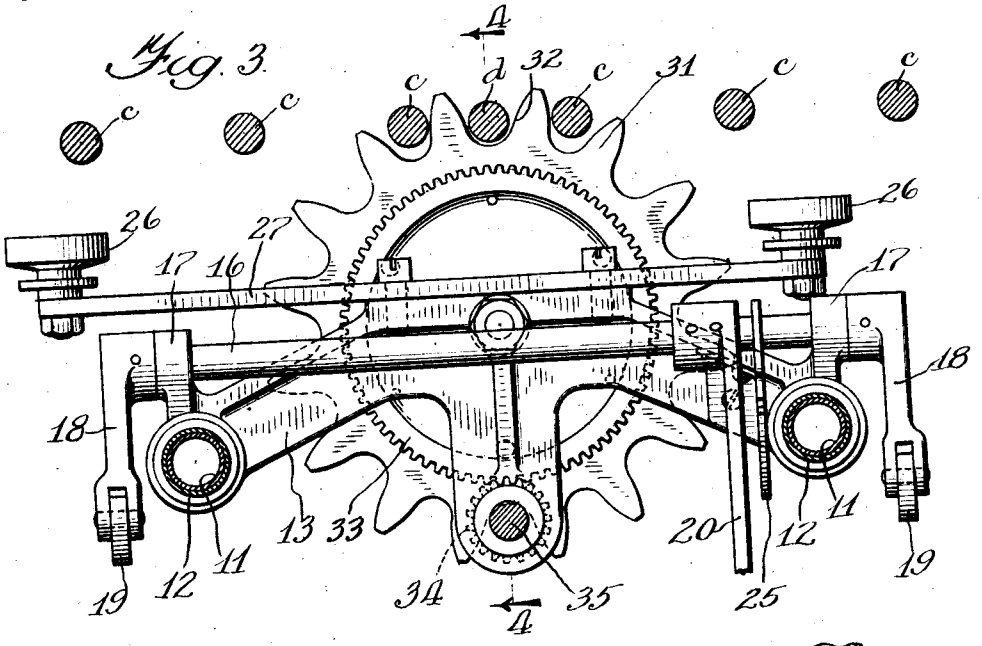


Fig. 4.

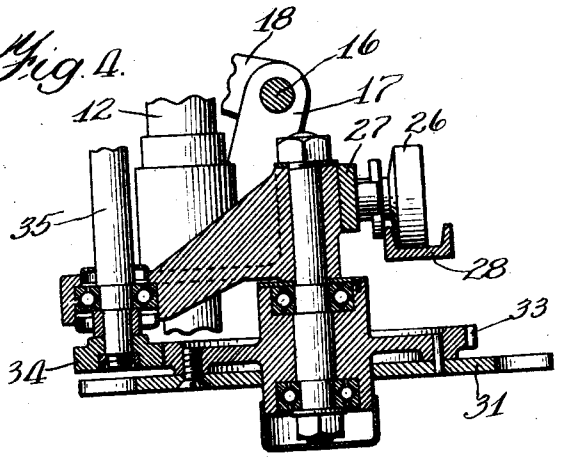


Fig. 5.

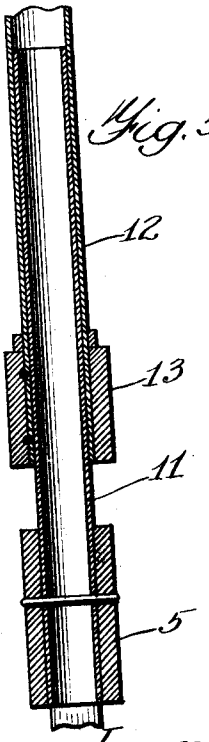
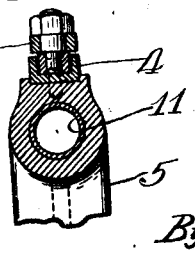


Fig. 6.



Witnesses:

J. C. Dewick.

George L. Chuidahl

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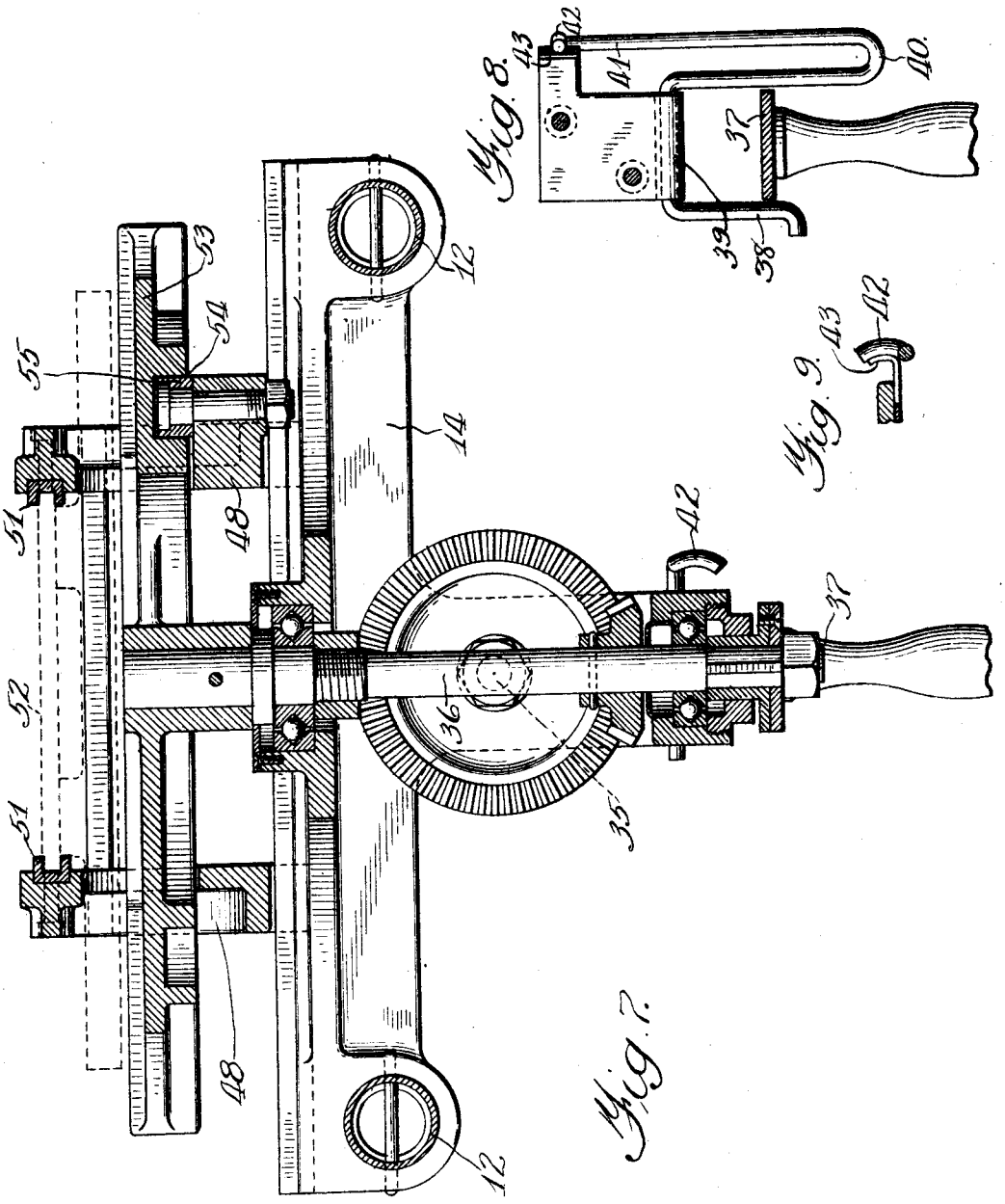
MACHINE FOR DOFFING SPINNING FRAMES.

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10 SHEETS—SHEET 4.



Witnesses:

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10 SHEETS—SHEET 5.

Fig. 10.

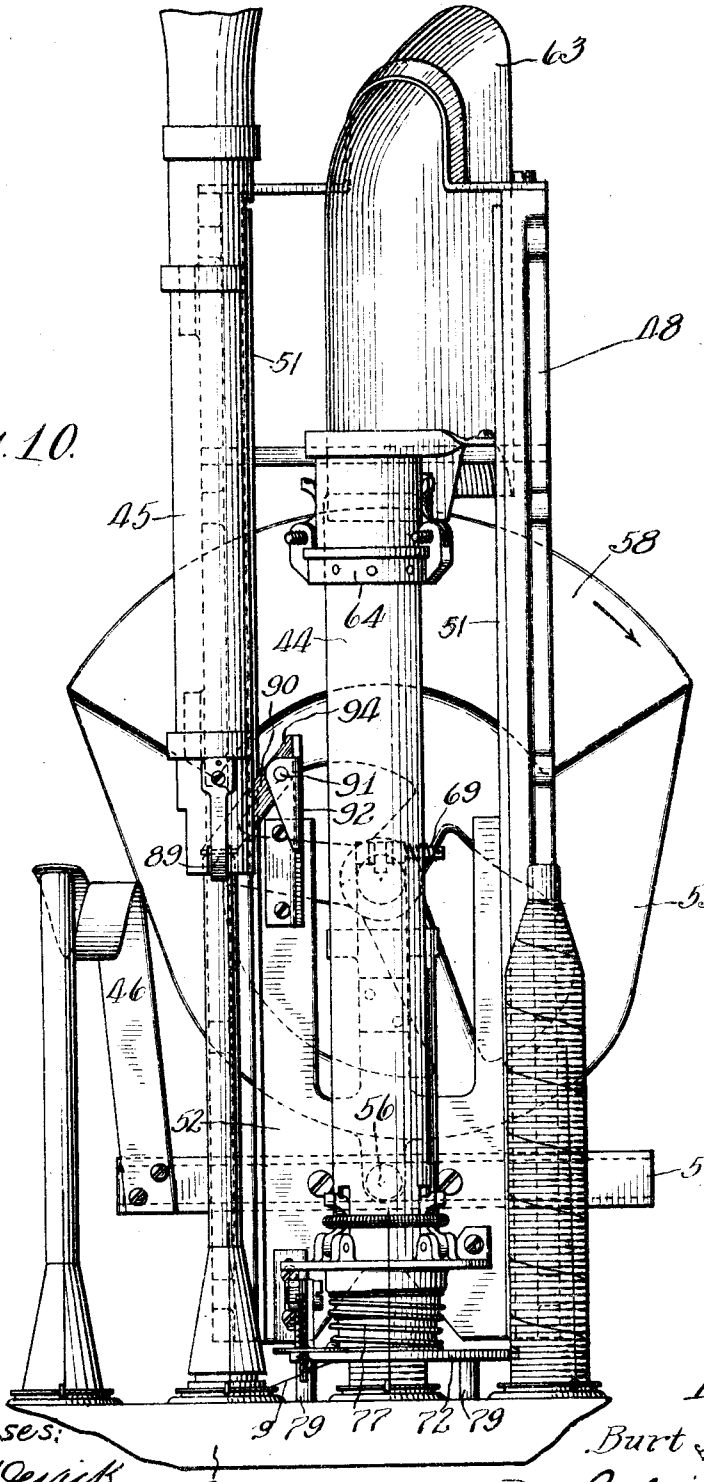
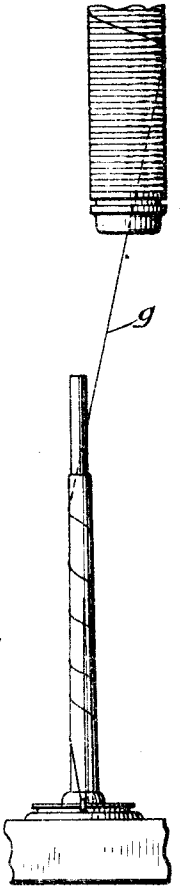


Fig. 11.



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Fig. 12.

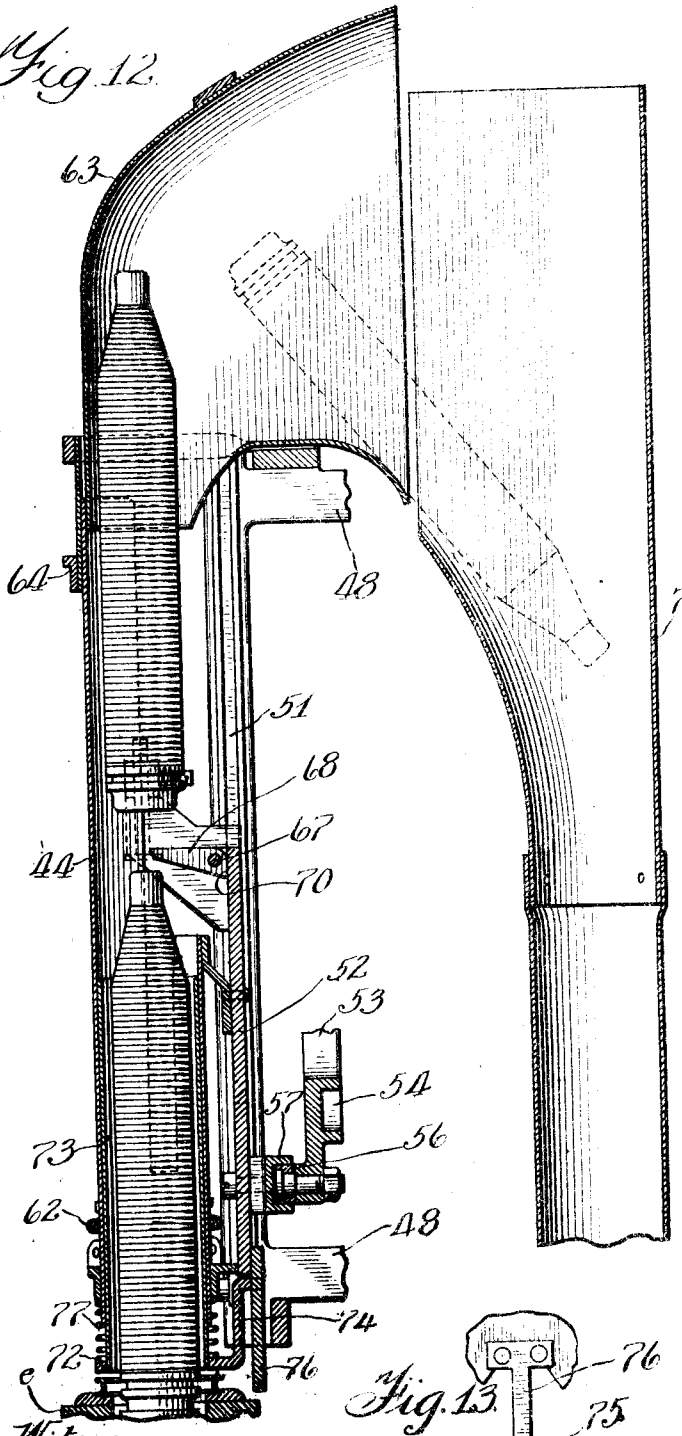


Fig. 14.

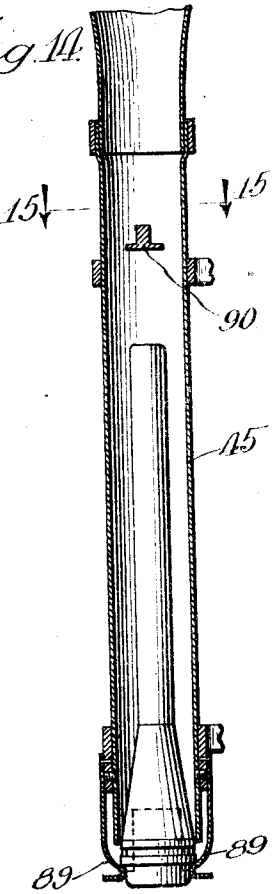
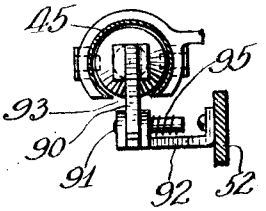


Fig. 13.

Fig. 15.



Witnesses:

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Fig. 16.

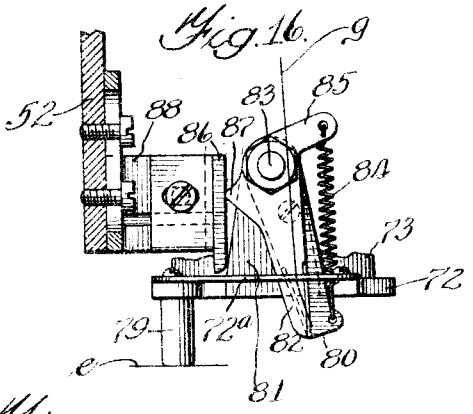


Fig. 17.

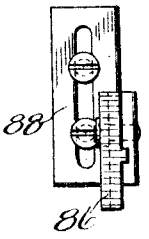


Fig. 18.

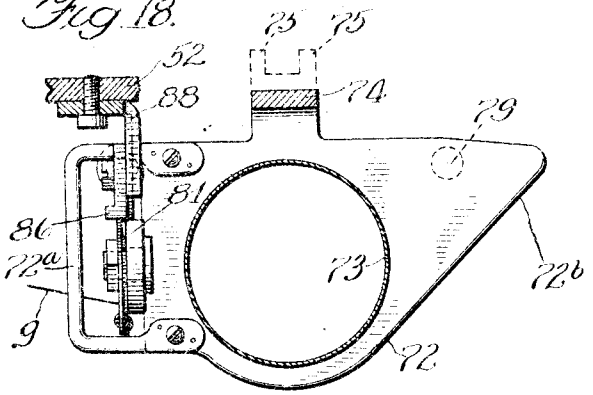


Fig. 19.

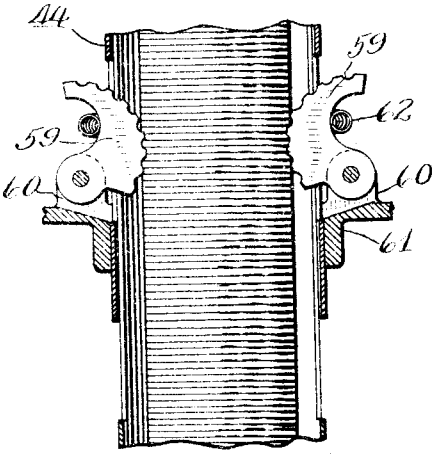


Fig. 20.

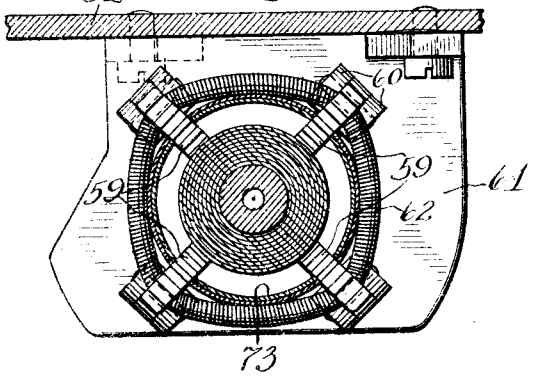
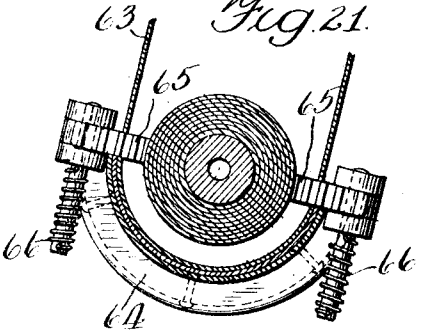


Fig. 21.



Witnesses:

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B. A. PETERSON.

MACHINE FOR DOFFING SPINNING FRAMES.

APPLICATION FILED DEC 2, 1910

Patented Nov. 3, 1914

10 SHEETS—SHEET 8.

1,115,564.

Fig. 22

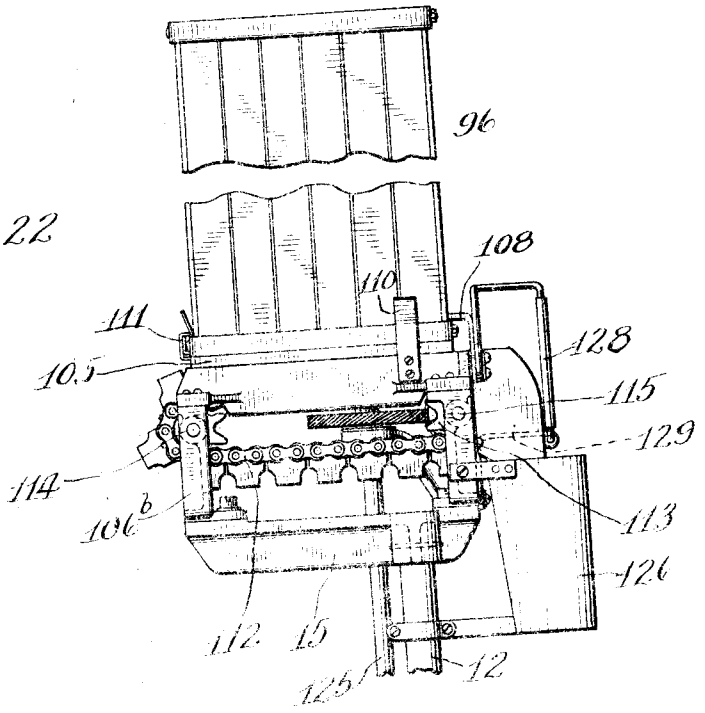
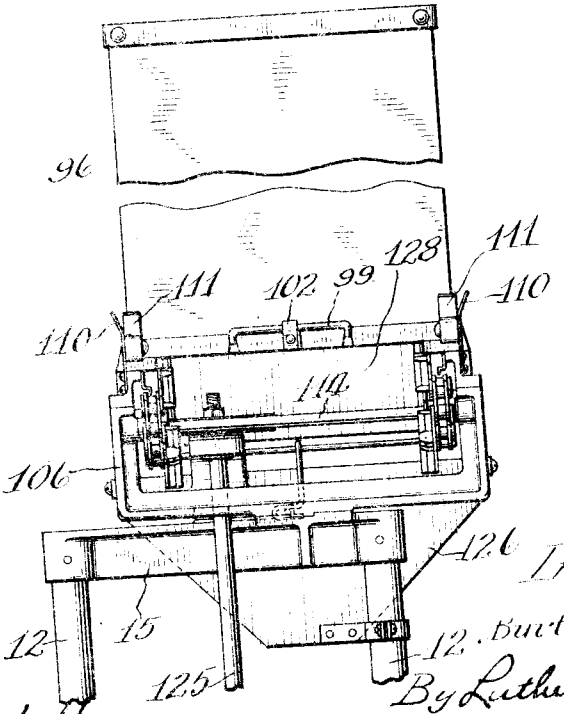


Fig. 23.



Witnesses:

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MACHINE FOR DOFFING SPINNING FRAMES.

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Patented Nov. 3, 1914.

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Fig. 24.

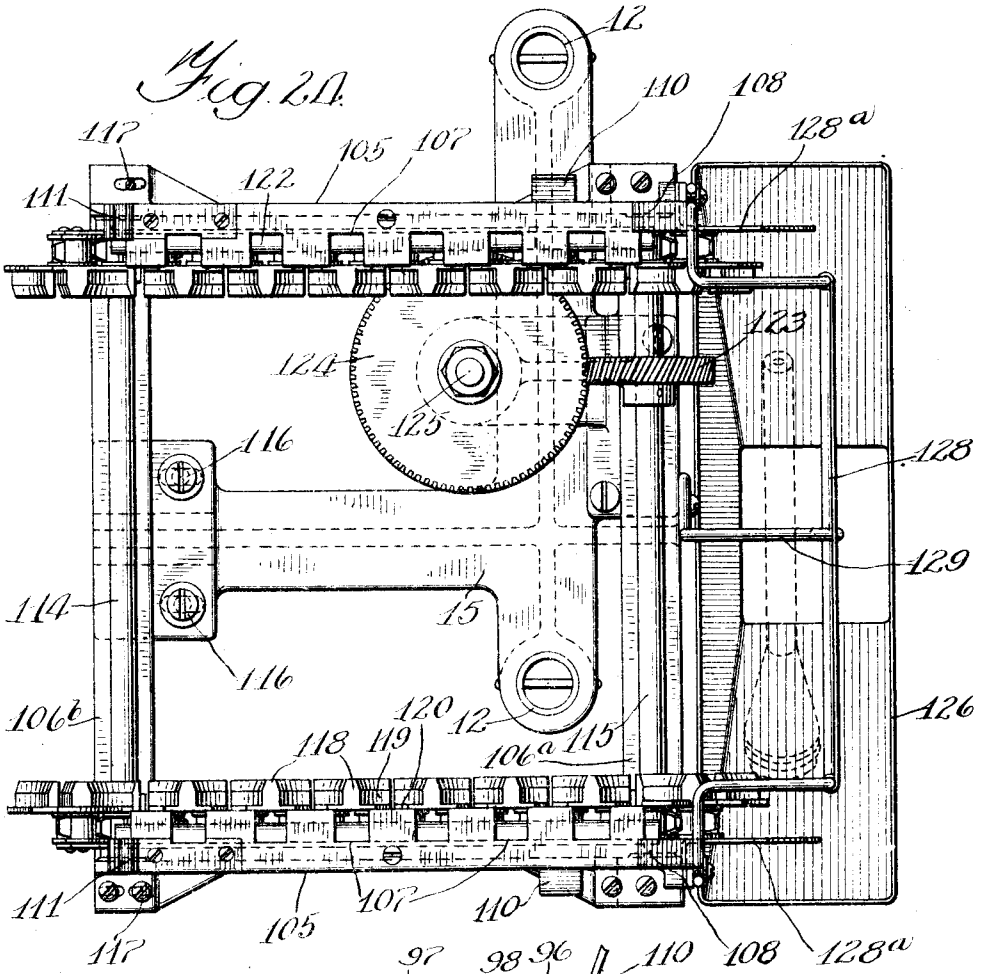
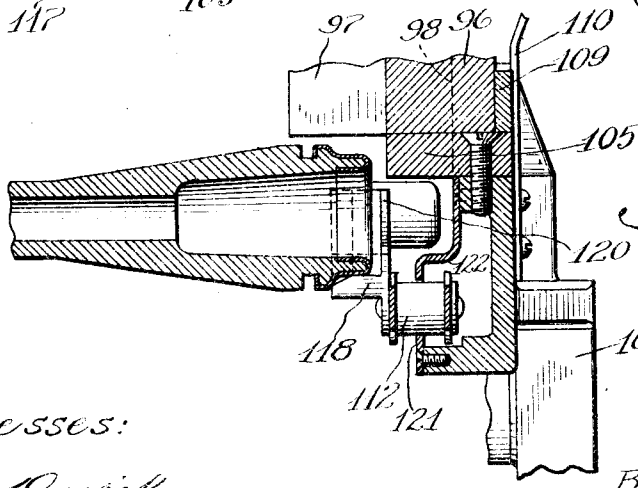


Fig. 25.



Witnesses:

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B. A. PETERSON.

MACHINE FOR DOFFING SPINNING FRAMES.

APPLICATION FILED DEC. 2, 1910.

1,115,564.

Patented Nov. 3, 1914.

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Fig. 26.

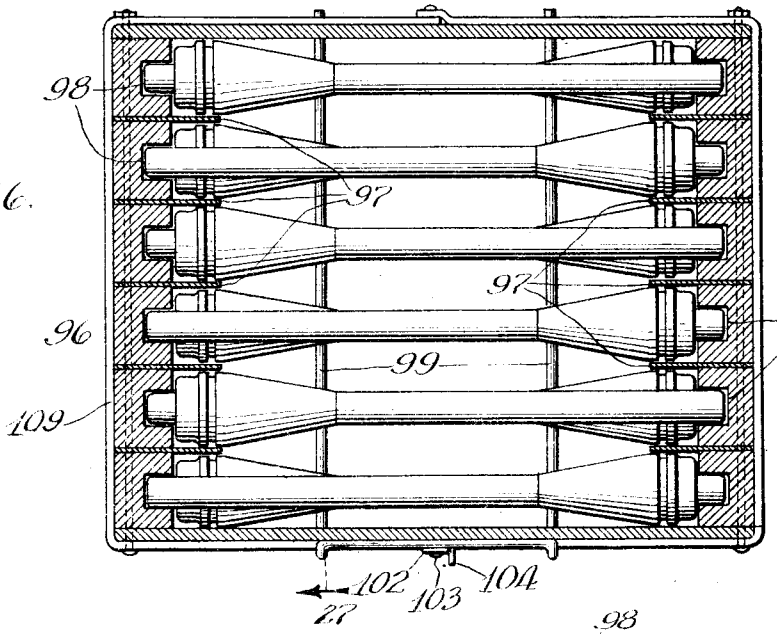


Fig. 28.



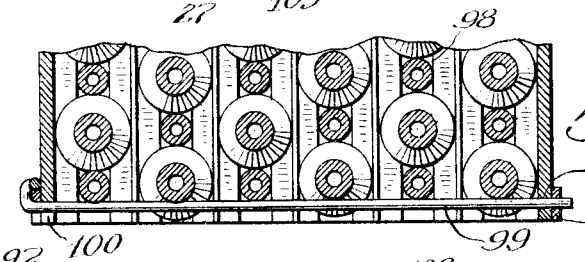


Fig. 27.

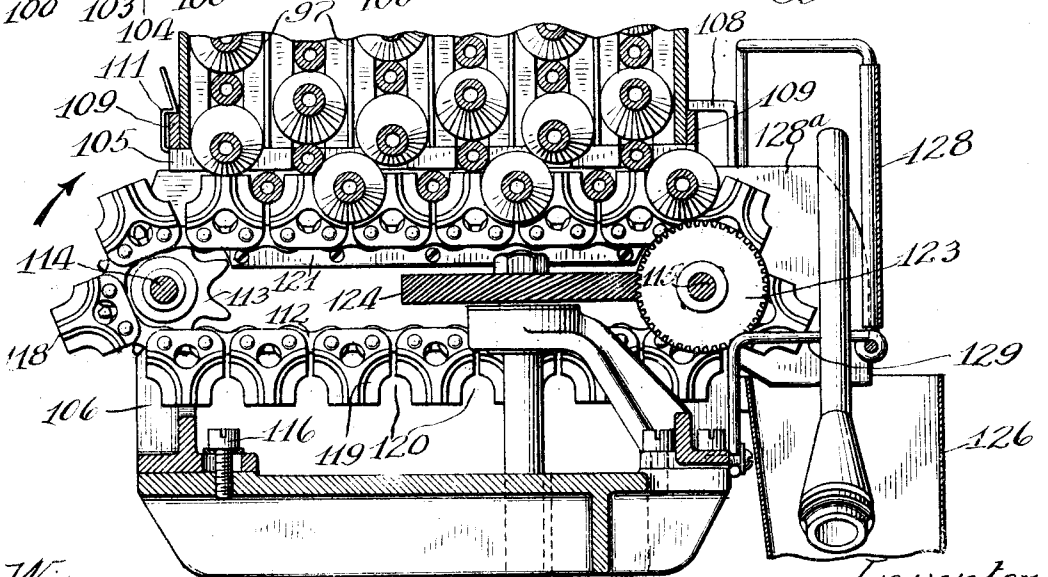


Fig. 29.

Witnesses:

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UNITED STATES PATENT OFFICE.

BURT A. PETERSON, OF ROCKFORD, ILLINOIS, ASSIGNOR TO HOWARD D. COLMAN, LUTHER L. MILLER, AND HARRY A. SEVERSON, COPARTNERS DOING BUSINESS AT ROCKFORD, ILLINOIS, AS BARBER-COLMAN COMPANY.

MACHINE FOR DOFFING SPINNING-FRAMES.

1,115,564. Specification of Letters Patent. Patented Nov. 3, 1914.

Application filed December 2, 1910. Serial No. 595 229.

To all whom it may concern:

Be it known that I, BURT A. PETERSON, a citizen of the United States, residing at Rockford, in the county of Winnebago and State of Illinois, have invented certain new and useful Improvements in Machines for Doffing Spinning-Frames, of which the following is a specification.

The object of this invention is the production of an improved machine for replacing the filled bobbins of spinning frames with empty bobbins, the present embodiment being especially adapted to handle "weft" or "filling" bobbins.

In the accompanying drawings, Figure 1 is a fragmental side elevation of a doffer embodying the features of my invention, the doffer being shown in operative relation to a spinning frame. Fig. 2 is a fragmental front view of the doffer. Fig. 3 illustrates a means for feeding the doffer along a spinning frame, and for timing its movements with reference to the bobbins. Fig. 4 is a sectional view taken in the plane of line 4 4 of Fig. 3. Fig. 5 illustrates one method of connecting together the two portions of the carriage or supporting frame of the machine for relative movement between the sections. Fig. 6 is a section on line 6 6 of Fig. 2. Fig. 7 is a horizontal sectional view through the doffer taken in the plane of the axis of the drive shaft, a portion of the mechanism being omitted. Figs. 8 and 9 illustrate a means for locking the actuating crank in its initial position. Fig. 10 is a view of the doffing, donning and bobbin-seating devices, as seen from the rear of the doffer, showing said devices in operative relation to bobbins upon a spinning frame. Fig. 11 represents the manner in which a few wraps of the thread are transferred from the bobbin being doffed to its spindle. Fig. 12 is a sectional view through the doffing devices and the guide tube for the doffed bobbins. Fig. 13 represents a guiding and limiting means for the shear-supporting structure. Fig. 14 is a sectional view through the donning tube, showing an empty bobbin therein, and showing the bobbin ejector in section. Fig. 15 is a section on line 15 15 of Fig. 14. Fig. 16 represents the thread shear and its actuating means. Fig. 17 illustrates the adjustably-mounted cam for actuating the shear. Fig. 18 illustrates the shear and the shear-supporting bracket in plan view. Fig. 19 is a fragmental vertical sectional view through the doffing tube. Fig. 20 is a horizontal section through the doffing tube, showing the first set of bobbin-engaging devices. Fig. 21 is likewise a horizontal sectional view through the doffing tube, showing the second set of bobbin-engaging devices. Fig. 22 is a fragmental side elevation of the empty-bobbin magazine and the devices for feeding empty bobbins. Fig. 23 shows said parts in front elevation. Fig. 24 represents the seat provided in the doffer framework for the bobbin magazine, showing also the bobbin-feeding devices. Fig. 25 is a fragmental detail of the bobbin-feeding means. Fig. 26 is a horizontal section through the empty-bobbin magazine. Fig. 27 is a fragmental vertical section through said magazine. Fig. 28 represents a means for temporarily closing the lower end of the magazine. Fig. 29 is a vertical sectional view of the bobbin-feeding means.

In the embodiment which I have selected as illustrating my invention, the operating mechanisms, the magazine for empty bobbins, and the receptacle for full bobbins are mounted upon a framework or carriage adapted to be moved along the sides of a spinning frame, and also adapted to be rolled about the mill. The carriage consists of two sections, the lower one of which supports the full-bobbin receptacle, while the upper section carries the operating mechanisms and the empty-bobbin magazine.

The lower carriage section may be of any suitable construction. As herein shown, it comprises a bar bent to form the side portions 1 and the bottom portion 2. Two carrying rollers 3 are fixed to the side portions 1 near the lower ends thereof. The upper ends of the side bars 1 are bent, as at 4, to approach each other and are rigidly secured to a frame member 5.

The full-bobbin receptacle 6 may be constructed in any preferred manner. It is herein shown as adapted for insertion into the open frame formed by the members 1 and 2. It may be secured in place in said frame by any suitable means. In this instance a bar 7 is fixed upon the bottom of the box to bear against and lie in contact

with the bottom member 2. The sides of the box are notched, as at 8, to receive the bent portions 4 of the side bars 1, the walls 9 of the notches 8 bearing against said side bars to support the box. If desired, the box may be provided with handles of any suitable form, as 10.

The upper carriage section is connected to the lower section for movement relatively thereto in any suitable way. In this instance I have shown two upright columns 11 (Figs. 2 and 5) fixed to the frame member 5, upon which columns the upper carriage-section is supported for vertical movement. In the present embodiment the upper carriage-section consists of two tubes 12 slidably surrounding the columns 11, a bottom cross-piece or bracket 13 (Figs. 2 and 3), a middle bracket 14 (Fig. 7), and a top cross-piece 15 (Fig. 23), said cross-pieces being rigidly fixed to the tubes 12.

The means for moving the carriage sections relatively to each other may be of various forms. That herein shown consists of a rock shaft 16 (Fig. 3) mounted in lugs 17 on the bottom bracket 13, two arms 18 fixed on the ends of said shaft, links 19 connecting said arms with the lower carriage-section, and a hand lever 20 fixed upon the rock shaft 16. If desired, means may be provided for locking the sections against relative movement. In this instance, there is shown a spring-actuated detent 21 on the hand lever 20 arranged to engage in either of three notches 22, 23 and 24 in a locking sector 25 fixed to the frame member 13.

In that form of the invention which is herein shown, the doffer is arranged to be supported upon the spinning frame by means of two grooved rollers 26 mounted upon the ends of a bar 27 (Fig. 3) fixed to the bottom cross-piece 13. These rollers run on a channel bar rail 28 attached to the spinning frame in any suitable manner adjacent to the forward edge of the spindle rail c. 29 is a roller carried by a bracket 30 fixed to the bottom cross-piece 13 and bearing against the lower flange b of the spindle rail. In this instance, the timing and feeding mechanism that moves the doffer along the spinning frame and keeps it in step with the spindles comprises a star wheel or gear wheel 31 (Figs. 1 and 3) rotatably mounted in a horizontal position upon the lower side of the bottom cross-piece 13 in position to engage the spindle bases e, said bases constituting a rack with which the toothed wheel 31 engages. Said wheel may have double teeth, or in other words, the ends of the teeth may be concave, as at 32 to clear the rods d (Fig. 3) that carry the ring rail c.

Fixed with relation to the star wheel 31 is a gear wheel 33 (Fig. 4) meshing with a pinion 34 rigidly mounted on the lower end of a vertical shaft 35. This shaft is supported in bearings on the transverse frame members 13 and 14. In this instance, the shaft 35 is arranged to be rotated manually through the medium of a horizontal shaft 36 mounted in the bracket 14, the forward end of said shaft 36 bearing a hand crank 37 and said shafts being geared together. When the machine is not in use, the mechanism may be locked against operation, and in its initial position, by suitable means, such as a fork 38 (Fig. 8) formed up in this instance from a metal rod, pivotally supported in a bearing 39 attached to the cross-piece 14. The portion 40 constitutes a handle by means of which the fork may be swung into and out of engagement with the crank 37. The fork may be yieldingly held in operative position by any suitable means, as, for example, by providing the spring arm 41 having a bent portion or socket 42 adapted to engage with a projection 43 upon the middle cross piece 14. When the handle 40 is depressed to swing the fork out of engagement with the crank, the spring arm 41 yields and passes out of engagement with said projection.

As hereinbefore stated, the upper carriage section supports the operating mechanisms, which mechanisms, in this embodiment, comprise a doffing tube 44, a donning tube 45 and a bobbin seater 46 (Fig. 10), said tubes and bobbing seater being arranged side by side, the distances between the centers of said tubes, as well as the distance between the center of the donning tube and the operative portion of the bobbin-seater, being equal to the distance between the centers of adjacent spindles.

In operation, the doffer has a continuous movement along the spinning frame, while the doffing tube has an intermittent movement along said frame, said tube moving downward over a filled bobbin and rising with said bobbin during each pause between the steps of its progressive movement along the spinning frame. The donning tube also moves intermittently along the spinning frame, pausing above each spindle while a bobbin is being ejected from the tube onto said spindle. The movements of the bobbin-seater are similar to those of the doffing tube. To obtain these various movements, I have provided mechanism which is herein shown as comprising a horizontally slidable framework consisting of two slides 47 secured to a frame 48. In the opposing faces of the slides 47 are formed ball races complementary to ball races on the bracket 14, a series of spaced balls being provided in each pair of races. The lower slide 47 is secured to the frame 48 by screws 49 extending through elongated openings in said slide. Adjusting screws 50 seated in the frame 48 bear at their upper ends against the lower slide 47, and thus constitute means

for adjusting the ball bearings for the sliding framework. Fixed to the frame 48 are two vertical grooved guide bars 51 (Figs. 7, 10 and 12) in which is mounted a slide 52, to which slide the doffing tube 44 is attached. The donning tube 45 and the bobbin-seater 46 are attached to the sliding framework.

The means herein shown for reciprocating said framework horizontally with relation to the carriage, and for vertically reciprocating the slide 52 with relation to said framework comprises a cam disk or wheel 53 (Figs. 2, 7 and 10) secured to the rear end of the shaft 36. In one face of said wheel is a cam groove 54 to receive a roller stud 55 carried by the sliding framework; and upon its opposite face is a roller stud 56 (Figs. 10 and 12) fitting in a channel bar 57 secured to the slide 52. The weight of the slide 52 and the parts carried thereby is counterbalanced by the weight-portion 58 of the cam wheel. The contour of the cam groove 54 is such that the sliding framework is stationary with reference to the spinning frame while a filled bobbin is being removed, and is then given a quick forward movement to place the doffing tube, the donning tube and the bobbin-seater in register with succeeding spindles.

The devices that engage the filled bobbins to remove the same from the spindles consist, in the present embodiment, of dogs 59 (Fig. 19) with eccentric toothed gripping faces, said dogs being pivotally mounted between ears 60 upon a bracket 61. Said bracket is fixed to the slide 52. The dogs 59 extend through slots in the doffing tube 44, the inward movement of said dogs being limited by the bracket 61 or by engagement with a filled bobbin, while the upward and outward movement of the dogs is restrained by a coiled spring 62. When the tube 44 descends over a filled bobbin, the dogs 59 yield outwardly, and on the upward movement of the tube the dogs grip the bobbin and cause it to rise with the tube. The latter serves the purpose of a conduit or guide through which the doffed bobbins are conducted away from the bobin-engaging means 59, as will appear hereinafter. The forward side of the upper part of the tube is cut away, as indicated in Fig. 12, to prevent interference with a flaring bobbin-guide 63 fixed to the structure 47 48 in line with the reciprocatory movement of said tube.

Upon a bracket 64 that is fixed to the sliding framework and embraces the upper part of the doffing tube or conduit 44 are pivotally mounted two diametrically opposed gripping dogs 65 (Fig. 21) similar to the dogs 59, springs 66 tending to swing said dogs 65 inwardly into position to engage a bobbin.

Pivoted to the slide 52 at 67 (Fig. 12) is a finger 68 projecting toward the center of the tube 44, said finger being arranged to yield upwardly against the tension of a spring 69 (Fig. 10), the operative position of the finger being determined by the contact of the shoulder 70 with the slide 52.

The operation of the bobbin-removing devices may be briefly described as follows: The tube 44 descends over a filled bobbin. When the tube rises the dogs 59 cause the bobbin to be pulled off its spindle, the tube in its upward movement carrying the doffed bobbin into the space between the dogs 65. The sliding framework is then given a quick horizontal movement to carry the tube into position above the next succeeding filled bobbin. When the tube starts to descend upon said succeeding bobbin, the bobbin that was lifted into the space between the dogs 65 is gripped and retained by said dogs in the position occupied by the upper bobbin in Fig. 12. When the bobbin is thus retained by the dogs 65, the finger 68 swings aside as the tube 44 and slide 52 descend, and snaps into position beneath said bobbin when the finger has passed the bobbin. Upon the next upward movement of the tube and slide, the finger 68 pushes the upper bobbin into the bobbin-guide 63, the curved form of the upper wall whereof causes the bobbin to tilt and be discharged into the flaring upper end of a vertical guide tube 71. From the guide tube 71 the bobbins drop into the box 6.

Means is provided for severing the yarn extending from the drawing rolls to the bobbins. In this instance, the yarn-cutting means is mounted to travel with the doffing tube, and is arranged to be actuated through relative movement between the cutter-support and the tube. The cutter-support consists of a bracket 72 fixed to a tube 73 telescoping slidably with the tube 44. At the forward side of said bracket is a guide arm 74 (Fig. 12) having two fingers 75 thereon arranged to slide at either side of a guide 76 fixed to the slide 52. It will be seen that the parts 74 and 76 serve to prevent rotation of the tube 73. A coiled spring 77 tends to move the bracket 72 downwardly with relation to the tube 44 to the extent permitted by contact of the fingers 75 with the lower end 78 of the guide 76. On the lower side of the bracket 72 are two pins 79 arranged to strike against the ring rail as the doffing tube 44 descends and thus support the cutter-support at a suitable height with reference to the yarn to be sheared.

The cutter comprises a blade 80 (Fig. 16) fixed to a lug 81 on the bracket 72, and a blade 82 pivoted at 83 on said lug. A spring 84 acting upon an angular extension 85 of the blade 82 tends to swing said blade to open the shear. The shear is closed by a cam

86 carried by the slide 52 and arranged to engage a projection 87 on the pivoted blade 82. In this instance, the cam 86 is mounted for horizontal adjustment on a bracket 88 which in turn is arranged for vertical adjustment on the slide 52 (Figs. 16, 17 and 18). As the tube 44 is descending the pins 79 strike the ring rail and thereby arrest the downward movement of the shear support. Continuing movement of the slide 52 and the tube 44 brings the cam 86 into engagement with the projection 87 on the shear blade 82, whereby the shear is actuated to sever the thread leading to the bobbin last doffed. 72ª is a guard fixed to the bracket 72 in position to overlie the thread to be cut. The guard 72ª insures an invariable position of the thread when being cut, and thus provides a fixed time for the cutting of the thread.

The donning tube 45 is rigidly fixed to the sliding framework parallel to the path of vertical reciprocation of the doffing tube 44. At the open lower end of the donning tube are two spring detents 89 adapted to releasably support an empty bobbin between them. In order to force a bobbin past said spring detents so that it shall drop onto the bare spindle above which the donning tube is positioned at the time, I provide suitable means, as, for example, an ejector 90 (Figs. 10 and 15) pivoted at 91 on a bracket 92 fixed to the slide 52, said ejector extending through a longitudinal slot 93 in the donning tube. Pivotal movement of the ejector in one direction is limited by the contact of the rear end 94 of said ejector with the bracket 92. Pivotal movement in the opposite direction is yieldingly resisted by a spring 95. When the slide 52 descends, the ejector 90 expels the bobbin from the tube 45, said bobbin dropping onto the bare spindle which is alined with said tube. When the slide 52 again descends (said slide having meanwhile advanced horizontally a distance equal to the distance between two adjacent spindles through a horizontal movement of the sliding framework) the donned bobbin is forced firmly to place on its spindle by the bobbin-seater 46, said device consisting in this instance of a spring arm secured to the channel bar 57.

Empty bobbins to take the place of those doffed in the operation of the machine may be carried in a magazine 96 shown in front elevation in Fig. 23 and in side elevation in Fig. 22. In the form herein shown the magazine is a rectangular receptacle arranged to contain a number of vertical tiers of bobbins, the tiers being kept distinct by short vertical partitions 97 (Fig. 26). The bobbins of a tier extend alternately in opposite directions, that is to say, the tip of one bobbin extends in one direction, while the tip of the next bobbin of the tier extends in the opposite direction. It will also be apparent from Fig. 27 that the bobbins of a given horizontal layer extend alternately in opposite directions. The butts of the bobbins lie between the partitions 97, and the tips of the bobbins are held against lateral displacement by being disposed within vertical slots 98 in the side walls of the magazine. When the doffer is in use, the lower end of the magazine is open, but while the magazine is being filled and handled separately from the doffer, its lower end is closed by suitable means, such as a wire bail 99, the two horizontal arms of which are adapted to lie in notches 100 and openings 101 in the lower edges of the magazine walls and partitions. Said bail is removably held in place by a latch 102 pivoted at 103 so that it may be turned into and out of position to overlie the bail, said latch having a finger portion or handle 104.

The magazine 96 is removably secured upon two bars 105 (Fig. 24) fixed to a framework 106 carried by the top bracket 15, said bars having notches 107 therein with which the slots 98 of the magazine register. In this instance the magazine is releasably attached to its support by means of several devices, to wit, two rigid angular stops 108 fixed to the framework 106 and adapted to overlie a band 109 extending about the lower end of the magazine, said stops engaging the rear side of the magazine; two rigid guides or stops 110 arranged to prevent lateral displacement of the magazine; and two spring catches 111 adapted to snap over the band 109 at the front side of the magazine.

In operation, the bobbins in the magazine rest upon a bobbin-feeding means located below the magazine and virtually forming the bottom of the latter. In the present embodiment, said bobbin-feeding means consists of a conveyer formed of two endless chains 112 mounted upon sprocket wheels 113, two of said wheels being mounted upon a shaft 114, and the other two upon a shaft 115, said shafts being supported in the framework 106. In order that slack in the chains may be taken up, the framework 106 is formed of a rear bracket 106ª rigidly attached to the number 15, and a front bracket 106ᵇ adjustably secured at 116 to said member 15. The front ends of the bars 105 are adjustably fixed to the bracket 106ᵇ as indicated at 117.

Each of the chains 112 has fixed thereto lugs 118 forming between them recesses 119 adapted to receive the butts of bobbins and other recesses 120 adapted to support the tips of bobbins. The upper runs of the chains 112 are supported upon rails 121, and are held from upward displacement by guard rails 122 (Figs. 24 and 25).

The conveyer is driven through a spiral

gear connection (123 124) between the shaft 115 and a vertical shaft 125 geared to the shaft 36.

At the discharge end of the conveyer is a hopper 126 having downwardly converging walls, the open lower end of which hopper is arranged immediately above the flaring inlet end 127 of the donning tube 45. Above the hopper 126 and directly opposite the discharge end of the conveyer is a guard plate 128, and at the sides of the discharge ends of the conveyer are other guard plates 128ª. A rod 129 extends across the space between the conveyer and the guard plate in a direction transverse to the length of the bobbins and midway of the width of the conveyer. When the bobbins discharged from the conveyer fall upon the rod 129 the butt ends of the bobbins swing downwardly, whereby the bobbins are caused to enter the hopper 126 butt-end first. From the hopper the bobbins drop into the donning tube, the ejector 90 yielding to permit the bobbins to pass it, and each bobbin being arrested by the spring detents 89 and held there a moment until the ejector forces it out of the donning tube.

It will be seen that gravity is employed to transfer the bobbins from the horizontal position which they occupy when discharged to the vertical position required previous to donning, mechanism for giving the bobbins an upright position being thus dispensed with. It will also be seen that the use of gravity is particularly advantageous where the bobbins are stacked with large and small ends alternating, as herein shown.

The bobbin-conveyer is arranged to discharge the bobbins at the rear side of the doffer and substantially directly above the donning point. This arrangement is advantageous where the bobbins are stored with butts and tips alternating, as each bobbin travels an equal distance in passing from the conveyer to the donning tube 45.

When the bobbins upon a spinning frame are ready to be doffed, the ring rail *e* is stopped in its lowermost position, and a few turns of yarn are spun around the lower ends of the bobbins. The spinning frame is then stopped, and the thread board *f* thrown back.

The crank 37 being in its locked position, a magazine 96 is placed upon the doffer, and the bail 99 removed from said magazine, whereupon the bobbins settle in the magazine until the lowermost bobbins rest upon the tops of the lugs. The crank is then unlocked and operated until the bobbin conveyer and the donning tube are properly supplied with bobbins. It will be seen that a movement of the conveyer equal to the pitch of the chains will cause the lowermost bobbins to slip into the recesses between the lugs 118 on the upper side of the conveyer, and that in the continued travel of the conveyer the tiers of bobbins will be exhausted successively beginning with the front tier (the left-hand tier in Fig. 29).

The conveyer and the donning tube having been supplied with bobbins, the crank 37 is again locked in the position shown in Fig. 1, wherein the mechanism is in its initial position, with the doffing tube elevated, and the doffer placed in operative relation to the spinning frame, the lower carriage-section being clear of the floor, the upper carriage-section being supported upon the rail 28, and the two sections locked together. The doffer may now be actuated and fed continuously along the spinning frame by operating the crank 37.

As the doffing tube 44 moves downward over a full bobbin, the dogs 59 swing outwardly upon their pivots to pass the bobbin. On the upward movement of the tube, the dogs engage the yarn on the bobbin and cause the bobbin to rise with the tube into the space between the dogs 65. When the tube descends upon the next bobbin the first is retained by the dogs 65, to be ejected by the member 68 on the next upward movement of the tube.

Referring now to Fig. 11: As the bobbin is lifted off its spindle by the dogs 59, a few wraps of the thread that was wound upon the lower end of the bobbin slip from the bobbin onto the spindle, as shown in Fig. 11, so that when an empty bobbin is placed on the spindle the thread will be caught and held by it. As the sliding framework 47 48 is moved forward with relation to the spinning frame, the doffing tube is moved into position over the next adjacent bobbin, the wedge-shaped portion 72ᵇ of the bracket 72 (Fig. 18) insuring by its plow-like action that the thread running to said bobbin shall not catch upon the upper end of the bobbin and be broken. When the doffing tube is lowered onto the last mentioned bobbin, the thread portion *g* running from the previously doffed bobbin to the spindle from which it was removed enters the shear 80 82 and is severed as the doffing tube completes its downward movement.

The foregoing detailed description has been given for the sake of clearness of disclosure only, it being understood that the embodiment described is susceptible of considerable modification without departure from the spirit of the invention.

I claim as my invention:

1. A bobbin magazine having a space extending from top to bottom of the magazine, to contain a tier of bobbins stacked with their butts and tips alternating, the width of the space being approximately

equal to the diameter of a bobbin butt, the dimension of said space which extends lengthwise of the respective bobbins being less than the length of the bobbin, and the magazine having means to prevent lateral displacement of the tips.

2. A doffer magazine having a space therein extending from top to bottom of the magazine, adapted to contain a tier of bobbins stacked with their butts and tips alternating, the width of said space being approximately that of a bobbin butt, and the opposite end walls of said space having vertical grooves therein to receive the tips of the bobbins.

3. In a doffer, a bobbin magazine, and means moving transversely of the bobbins in said magazine for removing them from the magazine and for constantly supporting the bobbins remaining in the magazine, said means moving toward the rear of the doffer to discharge the bobbins at the rear side of the doffer.

4. In a doffer, a bobbin magazine having a plurality of compartments therein adapted to contain bobbins stacked with their butts and tips alternating, said compartments having open lower ends, and a conveyer moving transversely beneath said compartments toward the rear side of the doffer and adapted to engage and remove bobbins from the magazine.

5. In a doffer, a framework, a bobbin magazine stationarily supported by the framework, and an endless bobbin conveyer arranged beneath said magazine and operating toward the rear side of the doffer and in a direction transversely to the bobbins in the magazine, for removing bobbins in the magazine.

6. In a doffer, a framework, an elevated bobbin magazine supported by said framework, means for removing bobbins from the magazine and for discharging them at the rear side of the doffer, and donning means carried by said framework and including a vertical tube arranged at the rear side of the doffer in position to receive the discharged bobbins.

7. In a doffer, a framework, a bobbin magazine stationarily supported by said framework, a conveyer operating beneath said magazine for removing bobbins from the magazine and discharging them at the rear side of said framework, and a donning tube having its inlet end vertically alined with the discharge end of said conveyer.

8. In a doffer, a magazine adapted to contain bobbins lying in a substantially horizontal position, an endless conveyer for removing bobbins from the magazine, and a fulcrum member onto which the bobbins discharged from the conveyer may fall and thereby be caused to tilt by gravity into an upright position.

9. In a doffer, a magazine adapted to contain bobbins arranged with their butts and tips alternating, a fulcrum member arranged in operative relation to said magazine and substantially midway of the length of the bobbins, and means for discharging bobbins from the magazine onto said fulcrum member whereby the bobbins are caused by gravity to assume an upright position.

10. In a doffer, a bobbin magazine adapted to contain bobbins arranged with their butts and tips alternating, a bobbin conveyer arranged beneath said magazine, and a fulcrum member arranged at the discharge end of said conveyer in position to be contacted by the discharged bobbins, whereby said bobbins are caused by gravity to assume an upright position.

11. In a doffer, a bobbin magazine adapted to contain bobbins arranged with their butts and tips alternating, a bobbin conveyer arranged beneath said magazine, a fulcrum member arranged at the discharge end of said conveyer in position to be contacted by the discharged bobbins, whereby said bobbins are caused by gravity to assume an upright position, a donning tube supported in the doffer in a vertical position below the fulcrum member, and a flaring hopper located beneath said fulcrum member and communicating with the upper end of said donning tube.

12. In a doffer, a bobbin magazine adapted to contain bobbins with their butts and tips alternating, and an endless chain conveyer arranged beneath said magazine, said conveyer comprising a series of lugs at each side of the conveyer, each series of lugs providing tip recesses and butt recesses.

13. In a doffer, vertically reciprocatory means for lifting a bobbin from a spindle, and pivoted dogs supported in position to receive the lifted bobbin from said lifting means.

14. In a doffer, vertically reciprocatory means for lifting a bobbin from a spindle, means adapted to receive the lifted bobbin from said lifting means, and means moving with the lifting means for discharging a bobbin from said receiving means.

15. In a doffer, vertically reciprocatory means for lifting a bobbin from a spindle, means for receiving the lifted bobbin, a curved bobbin-guide means located above said receiving means, and means moving with the lifting means for forcing the lifted bobbin from said receiving means into said guide means.

16. In a doffer, a supporting framework, a structure mounted to reciprocate horizontally with relation to said framework, a part mounted to reciprocate vertically upon said structure, a doffing element carried by said part, means carried by said structure

to receive a doffed bobbin, means carried by said part for discharging the doffed bobbin from said receiving means, and means for reciprocating said structure and said part.

17. In a doffer, a supporting framework, a structure mounted to reciprocate horizontally with relation to said framework, a part mounted to reciprocate vertically upon said structure, bobbin-engaging means carried by said part, bobbin-engaging dogs carried by said structure in position to receive and detain the bobbin engaged by said bobbin-engaging means, and a pivoted finger carried by said part and adapted upon the upward movement of said part to force the detained bobbin from said dogs, said finger being arranged to yield to pass a bobbin upon the downward movement of said part, and means for reciprocating said structure and said part.

18. In a doffer, a supporting framework, a structure mounted to reciprocate horizontally with relation to said framework, a part mounted to reciprocate vertically upon said structure, bobbin-engaging means carried by said part, a tube fixed to said part and alined with said bobbin-engaging means, one side of the upper portion of said tube being cut away, a curved bobbin guide fixed to said structure and alined with said tube, means on said structure adapted to engage and detain a bobbin raised by said bobbin-engaging means, means moving with said bobbin-engaging means for forcing the detained bobbin into said curved guide, and means for reciprocating said structure and said part.

19. A bobbin magazine having a space extending from top to bottom of the magazine to contain a tier of bobbins stacked with their butts and tips alternating, the width of said space being approximately that of a bobbin butt, and means at each side of said space arranged for contact with the ends of the bobbin butts to limit longitudinal movement of the respective bobbins, said means at opposite sides of the space being spaced apart a distance less than the length of a bobbin.

In testimony whereof I affix my signature in the presence of two witnesses.

BURT A. PETERSON.

Witnesses:
J. F. ELWOOD,
LOUISE A. CULVER.